

**Nevada Department  
of Transportation**



## **Storm Water Quality Manuals**

### **Construction Site Best Management Practices (BMPs) Manual**

*May 2004*



## Acknowledgements

This manual was prepared by Camp Dresser & McKee Inc. (CDM), under Nevada Department of Transportation (NDOT) Agreement P142-03-010, which was administered by Mr. Amir Soltani, Chief Hydraulic Engineer. The framework for the manual and its contents were developed under a previous agreement with the Department.

The content was developed from a variety of sources, written and unwritten. A Steering and a Technical Committee provided review of the document throughout its development. Special thanks are due to the committee members who spent many long sessions reviewing the material.

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It has been our pleasure to develop this document for NDOT. We believe it will provide a valuable source of information to help NDOT minimize short and long-term water quality impacts from water and air-borne sediment and other constituents of concern, and to provide NDOT with assistance in compliance with applicable Federal, State, and local storm water regulatory requirements.

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# NEVADA DEPARTMENT OF TRANSPORTATION

## STORM WATER QUALITY HANDBOOKS CONSTRUCTION SITE BEST MANAGEMENT PRACTICES (BMPs) MANUAL

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### PREFACE

This manual is to provide employees and other users with general information relevant to the storm water activities and responsibilities of the Nevada Department of Transportation. It is intended to provide guidance and reasonably uniform procedures and guidelines to affect an efficient and standardized application of storm water Best Management Practices (BMPs) for construction activities on the State's highway system. Since conditions may vary dramatically throughout the state, it may be appropriate to modify procedures in the field.

Construction managers are encouraged to make the manual available to all employees so they may familiarize themselves with construction site BMPs. A thorough understanding of policies and procedures will greatly assist the Department in meeting its objectives, and enable employees seeking advancement to enhance these opportunities.

Many state and NDOT manuals govern the operation of the Department. In some cases these documents are described; in others only a reference is made to the information and where it may be located.

This manual is not intended to establish a legal standard of care of conduct. It is a guide subject to modification and revision as conditions warrant.

Hard copies of this manual are available for purchase from NDOT Administrative Services. The manual will also be available for download from the NDOT website.



# NEVADA DEPARTMENT OF TRANSPORTATION

## STORM WATER QUALITY HANDBOOKS

### CONSTRUCTION SITE

### BEST MANAGEMENT PRACTICES (BMPs) MANUAL

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#### PROCEDURE FOR MANUAL REVISIONS

This manual was developed to reflect current policies, procedures, and practices. It is intended that the manual be periodically revised. Two procedures are included. For edits or updates, contact Thresa Zylstra, NDOT Hydraulics Administrative Assistant, at 775-888-7619.

##### Temporary Revisions

As new policies, procedures, and directives are developed, it is sometimes necessary to provide this information to field personnel prior to a scheduled revision. To expedite distribution of revisions, the Hydraulics Section will issue "Temporary Revisions" as needs arise. The "Temporary Revision" should be inserted in the manual prior to the page it modifies.

##### Scheduled Revisions

In October of each year, the Technical Committee will review the manual to determine if revisions are required. The Technical Committee is comprised of staff from design, construction, maintenance, environmental, materials, and FHWA and NDEP if necessary.

Revisions affecting department policies and procedures proposed by the Technical Committee will be reviewed by a Steering Committee. Results of the Steering Committee Meeting will be provided to the Technical Committee. After revisions have been approved, the Hydraulics Section will initiate the changes and distribute them to all holders of the manual. Revisions will be transmitted under a cover memorandum. Each page of the revision will contain a revision date. It will be the manual holders' responsibility to insert the new material in the manual.

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# Section 1

## Construction Site Best Management Practices (BMPs)

### 1.1 Introduction

The State of Nevada Department of Transportation (NDOT) has a comprehensive statewide effort to prevent pollution in storm water runoff from NDOT construction projects. NDOT requires contractors to prepare and implement a plan to control water pollution effectively during the construction of all projects within or in the vicinity of Waters of the United States (WOUS) - see Standard Specifications Section 637, Water Pollution.

Projects resulting in one acre (ac) or more of soil disturbance are subject to the State of Nevada Stormwater General Permit ("General Permit") and are required to prepare and submit a Storm Water Pollution Prevention Plan (SWPPP). When a SWPPP is required for a project, it will satisfy the requirements of Standard Specifications Section 637, in addition to meeting other permit requirements.

Projects in the Lake Tahoe area fall under the jurisdiction of the Tahoe Regional Planning Agency (TRPA). Construction permits are issued by TRPA for all projects and include specific water quality control and other environmental requirements that are often more stringent than those mandated under the General Permit.

### 1.2 Organization of this Manual

This *Storm Water Quality Handbooks, Construction Site Best Management Practices Manual* (Manual) is intended to provide contractors and NDOT staff with detailed information on how to comply with the "Water Pollution Control" requirements contained in NDOT's construction contract documents, and in the State of Nevada Division of Environmental Protection (NDEP) permit requirements through the implementation of construction site best management practices (BMPs). This manual is organized as follows:

- **Section 1** introduces the construction site best management practices (BMPs) Manual.
- **Section 2** provides general guidelines for the selection and implementation of construction site BMPs
- **Section 3** provides listing and working details for NDOT construction site BMPs for temporary soil stabilization.
- **Section 4** provides listing and working details for NDOT construction site BMPs for temporary sediment control.

- **Section 5** provides listing and working details for NDOT construction site BMPs for tracking control
- **Section 6** provides listing and working details for NDOT construction site BMPs for non-storm water management.
- **Section 7** provides listing and working details for NDOT construction site BMPs for waste management and materials pollution control.
- **Appendix A** provides a listing of frequently used abbreviations, acronyms, and definitions of terms used throughout this Manual.
- **Appendix B** provides a SWPPP Template that may be used to prepare SWPPPs.
- **Appendix C** provides a Water Pollution Control Plan (WPCP) Template that may be used to prepare WPCPs.

## 1.3 Requirements for General Permit Sites

### 1.3.1 Nevada General Construction Permit

On September 16, 2002, the NDEP adopted the *General Permit for Storm Water Discharges Associated with Construction Activity NVR100000*, hereby called "General Permit". The General Permit complies with provisions of the Federal Clean Water Act as amended (33 U.S.C. 1251 et. seq: the "Act") and Chapter 445A of the Nevada Revised Statutes (NRS).

Under these regulations, owners or operators (contractors) of all proposed private and public construction sites that disturb a total of one or more acres of land are required to obtain coverage under the General Permit. Additionally, the following specific cases require coverage under the General Permit:

- Any land disturbance that is part of a larger common plan of development or sale with a planned disturbance of one acre or greater,
- All temporary plants or operations set up to produce concrete, asphalt or other materials for a permitted construction project (these are permitted with the project but require a separate SWPPP),
- Any repaving operation of one or more acres that creates fine-grained sediments that are not immediately removed from the site and properly disposed of at an acceptable facility, and
- Any construction activity, including sites disturbing less than one acre that are designated by NDEP of the U.S. Environmental Protection Agency (EPA) to have a potential for contribution to a violation of a water quality standard or may significantly contribute pollutants to waters of the United States.



**Disturbance** is defined as clearing, grading, or excavating underlying and/or surrounding soil as part of a repaving operation. NDEP may also require general permit coverage if repaving operations create loose fine-grained material (e.g. asphalt millings) that is not immediately disposed of and/or is stockpiled on the site. If the material is immediately overlaid or hauled off-site, a permit may not be required depending on site-specific conditions.

Under the General Permit, eligible discharger(s) who have submitted a Notice of Intent (NOI), paid an annual filling fee, and developed and implemented a SWPPP, are authorized to discharge stormwater associated with:

- (1) Construction activity
- (2) Small construction activity
- (3) Industrial activity from temporary concrete, asphalt, and material plants or operations dedicated to the permitted construction project.

The NOI must be filed at least 48 hours before construction begins and the SWPPP must be prepared prior to submittal of the NOI. NDEP has the authority to waive General Permit requirements, such as preparing and implementing a SWPPP for small construction projects that will not have adverse impacts to water quality. Sites between one and five acres that have a rainfall erosivity factor less than five (5) during the period of construction may also be able to obtain a waiver. NDEP has the option not to allow waivers for small construction activity based on other criteria. A worksheet for the small construction site activity waiver may be obtained from the NDEP Bureau of Water Pollution Control Website (Stormwater Resource Information page) and submitted to NDEP for review. Other useful documents such as the NOI form and sample SWPPP can also be found at the website.

#### **1.3.1.1 Storm Water Pollution Prevention Plan (SWPPP)**

NDEP requires contractors to comply with the General Permit, and prepare and effectively implement a SWPPP during the construction of all projects. Projects resulting in one acre or more of soil disturbance, or the additional conditions listed in Section 1.3.1, are subject to the General Permit. The SWPPP must be prepared prior to submittal of the NOI and must remain on the project site at all times. The SWPPP must be prepared in accordance with good engineering practices and must consist of the components listed in the General Permit, Part IB, and listed below:

- Project information and description including: site location; type of project; contact information; estimated soil disturbance; and a description of potential receiving waters;
- Description of all proposed and implemented major land disturbing activities;
- Description and sequencing of construction activities;

*Section 1  
Introduction*

- Estimates of total area of the construction site and the area that will be disturbed;
- Estimates of pre- and post-construction runoff coefficients;
- A general location map and detailed site map(s) including drainage patterns, areas of soil disturbance, location of BMPs, borrow and equipment storage areas, and potential receiving waters;
- Description of proposed and implemented erosion, sediment, and waste control practices to be used on the site;
- Description of permanent stormwater management practices that will be installed during the construction process to control pollutants in stormwater discharges after completion of construction operations;
- Documentation of self-inspections, maintenance of BMPs, and corrective actions that will be implemented throughout construction;
- Location and description of any non-stormwater discharges and stormwater discharges from dedicated asphalt and concrete plants located off-site;
- Copy of approved state or local plans, including a copy of the General Permit requirements; and
- Certification by the owner/operator or authorized representative and all contractors who work on the construction site.

A sample SWPPP can be found at the NDEP website. A SWPPP template has been developed in Microsoft® Word 2000 and is included in Appendix B. The objectives of the SWPPP template are:

- (1) Provide easy data entry for owners/contractors to prepare SWPPPs (instructions can be viewed in the template while the SWPPP is being prepared).
- (2) Provide consistency in content and format of all SWPPPs prepared and submitted to NDOT (thus making the SWPPP review process more efficient).

### **1.3.2 TRPA Construction Permit**

As a regulatory agency, the TRPA reviews and permits construction projects, and seeks to minimize environmental impacts of new projects. Permits issued include Standard Conditions of Approval and Special Conditions for individual projects. Permanent and temporary erosion control BMPs are required for applicable projects.

There are numerous differences between typical TRPA construction permit conditions and those in the General Permit. The TRPA permits are issued individually and are



generally more stringent. Contractors are subject to the following requirements for all TRPA approved projects:

- Comply with all conditions of the TRPA permit and the General Permit.
- The contractor's engineer must attend the pre-grade meeting with TRPA and their contract compliance officer to identify all other BMP items required by TRPA.
- Include any additional BMP requirements in the contractor's SWPPP.

### 1.3.3 NDOT Contract Requirements

All NDOT contracts require contractors to comply with Section 637 of the Standard Specifications and may include Special Provisions for pollution control. These specifications and provisions require contractors to comply with the General Permit for all projects greater than one acre. For all construction projects, Section 637 of the Standard Specifications requires that a Water Pollution Control Plan (WPCP) be submitted to the Engineer no later than 7 days before the pre-construction conference for projects within or in the vicinity of WOUS. For projects that are covered under the General Permit and are within or in the vicinity of WOUS, contractors shall prepare, submit, and effectively implement a SWPPP that fulfills both the General Permit requirements and those in Section 637 for a WPCP.

If revisions to the WPCP or SWPPP are required, as determined by the Engineer, the contractor shall incorporate the revisions. The time frames for WPCP and SWPPP submittal, review, and resubmittal are specified in the Standard Specifications and the project's Special Provisions. No construction activity having the potential to cause water pollution, as determined by the Engineer, shall be performed until the WPCP or SWPPP has been completed to the satisfaction of the Engineer. Construction activities such as traffic control, which will not threaten water quality, may proceed without a SWPPP, if allowed by the Engineer. NDOT will review the WPCP and SWPPP for fulfillment of the terms of the contract only. The contractor is responsible for all regulatory compliance issues and will be responsible for any penalties or fines imposed by the NDEP for regulatory non-compliance.

For sites covered by the General Permit, the contractor is responsible for filing the NOI, and is the responsible permittee with NDEP. This includes being responsible for any fees associated with permit procurement, and for executing the permit requirements, as well as being responsible for any fines levied by a regulatory agency for water management violations.

#### 1.3.3.1 Project Categorization and Temporary Erosion Control Plans

NDOT has adopted a policy of categorizing all construction projects as having no, low, medium or high potential for water quality impacts. The general definitions of each project category are as follows:

- **No impact:** Projects with ground/soil disturbance less than one acre and no direct discharge into WOUS.



- **Low Impact:** Projects with little ground/soil disturbance and low potential for discharge of sediment into WOUS.
- **Medium Impact:** New construction projects with potential discharge of sediments into a WOUS. Ground/soil disturbance is not excessive, construction phasing is simple, and construction duration is usually less than two years.
- **High Impact:** Projects with major ground/soil disturbance; high potential of sediment discharge; complex construction staging; and construction duration is longer than two years. All projects in the Lake Tahoe Basin are classified in this category.

For projects categorized as having no, low, or medium potential impacts, the contractor is responsible for SWPPP development including design of temporary BMPs and temporary erosion control plans.

For projects categorized as having a high potential for water quality impacts, NDOT will develop temporary erosion control plans for temporary BMPs for one possible construction phase and will include bid items in the final project plans and specifications. For these projects, the contractor is then required to employ a Professional Engineer (P.E.) to develop the SWPPP in compliance with the General Permit. Additionally, a P.E. must be responsible for the design of temporary BMPs, as specified within the BMP Fact Sheets included in this manual.

NDOT will include specific temporary BMPs in the design under any of the following conditions:

- The project is categorized as having high potential for water quality impacts,
- Specific construction site (temporary) BMPs are prescribed by the NDEP, TRPA or other environmental permits or certifications,
- The National Environmental Policy Act (NEPA) process has identified sensitive receiving waters or valuable habitats requiring special protection.
- There are site-specific conditions or sources of pollution that would not be adequately addressed by "typical" SWPPP and WPCP deployment strategies.

#### 1.3.3.2 Payment for Pollution Control

The method of payment for pollution prevention will be described in the project's Special Provisions and are based on the project's potential environmental impact categorization discussed above. Payment methods are defined as follows:

- **No or Low Impact Projects:** Include a \$5,000.00 lump sum item in the project estimate.
- **Medium Impact Projects:** NDOT will specify minimum BMP implementation standards and a range for the appropriate lump sum payment for these projects.

- **High Impact Projects:** NDOT's Hydraulic section will develop plans for one possible construction phase and include bid items in the final PS&E document. There may be instances for which utilizing the lump sum item and refraining from plan development will be more appropriate.

### 1.3.4 Requirements for Sites not Covered by the General Permit

Sites that disturb less than one acre of soil are not covered under the General Permit, unless they are designated by NDEP or EPA to have a potential for contribution to violation of a water quality standard or may significantly contribute pollutants to WOUS will also require coverage under the General Permit. The special provisions will identify such projects.

Section 637 of the Standard Specifications requires that a Water Pollution Control Plan (WPCP) be submitted to the Engineer no later than 7 days before the pre-construction conference, regardless of the size of the project if it is within or in the vicinity of WOUS. To help contractors to comply with the requirements of Section 637, a Water Pollution Control Plan (WPCP) short-form has been developed and is shown in Appendix C of this Manual. The form lists all construction BMPs and the contractor then selects (and checks in the form) which BMPs will be implemented during construction. The requirement of Section 637 should be carefully reviewed by the contractor while preparing WPCPs.

## 1.4 Air Quality Regulations

NDOT projects may also require coverage under various Air Quality or Dust Control Permits. NDOT contractors are responsible for obtaining these permits from the appropriate agency. In Nevada, air quality is regulated by the NDEP or, within Washoe and Clark Counties, by each county's Air Quality Management Divisions. Permit requirements for the different jurisdictions are discussed below.

Air quality permits will also typically require some type of permanent soil stabilization after construction is complete. This stabilization may or may not be sufficient to satisfy the final stabilization requirements of the General Permit. The following methods shall be used to satisfy the final soil stabilization requirement of air quality permits for NDOT Projects:

- In the North areas of the state, seeding, slope paving and application of millings to the shoulders will be the methods of stabilization.
- In southern urban areas, where re-vegetation is not successful, slope paving or rock mulch will be the methods of stabilization for cut and fill slopes. For aesthetic reasons, in an area contained within the landscape master plan, millings are not appropriate.
- In southern rural areas, soil stabilizers, slope paving, or application of millings will be the methods of soil stabilization.



## Section 2

# Selecting and Implementing Construction Site Best Management Practices

### 2.1 Introduction

This section provides instructions for the selection and implementation of construction site best management practices (BMPs). It is important to note that the requirements of this Section are NDOT minimum requirements, and that the contractor may implement additional construction site BMPs if deemed necessary to meet permit requirements or control pollutant discharges. Any additional requirements will be included in the project's Special Provisions. Working details of the construction site BMPs listed in this Section are presented in Sections 3 through 7 of this Manual.

### 2.2 NDOT Construction Site BMPs

This section lists those BMPs to be considered during the construction of NDOT projects. Construction site BMPs, also called temporary control practices, are best conventional technology/best available technology (BCT/BAT) based BMPs that are consistent with the BMPs and control practices required under the General Permit. NDOT construction site BMPs are divided into categories (see Table 2-1).

#### 2.2.1 Minimum Requirements

NDOT has selected some BMPs as *Minimum Requirements* that must be implemented on all highway construction projects statewide. Implementation is dependent on conditions and applicability of deployment described as part of the BMP. These BMPs are typically implemented as applicable in all NDOT construction projects; they include practices for soil stabilization, sediment control, wind erosion control, tracking control, non-storm water management, and waste management.

There are other construction site BMPs that may be implemented, on a project by project basis, in addition to the minimum required BMPs, and when determined necessary and feasible by NDOT or by the contractor. NDOT may, on a project-by-project basis, specify or require contractors to implement some of these construction site BMPs. Additionally, NDOT will consider a contractor's recommendation to implement some of these or other construction site BMPs on a project, subject to NDOT's approval.

Construction site BMPs within each of the categories are described throughout Sections 3 through 7 of this Manual. Table 2-1 lists the minimum required construction site BMPs. It is important to note that some BMPs are grouped in order to show that a combination of those BMPs will enhance protection over the use of only one BMP, or to show that one BMP can be selected from multiple equivalent choices.

Section 2  
Selecting and Implementing Construction Site Best Management Practices

<b>Table 2-1</b> <b>CONSTRUCTION SITE BMPs</b> <b>MINIMUM REQUIREMENTS <sup>(1)</sup></b>				
<b>SEDIMENT CONTROL</b> Protect waterways, drainage and storm drain In addition to all of the required BMPs employ at least one BMP option				
Sheet No.	Best Management Practice	Required	Option	Section
SS-1	Scheduling	X		3
SS-2	Preservation of Existing Vegetation	X		3
SC-7	Street Sweeping and Vacuuming	X		4
SC-8	Storm Drain Inlet Protection	X		4
NS-4	Temporary Stream Crossing <sup>(2)</sup>	X		6
SC-1	Silt Fence		X	4
SC-2	Sediment Basin		X	4
SC-3	Sediment Trap		X	4
SC-5	Fiber Rolls		X	4
SC-6	Gravel Bag Berm		X	4
<b>NON-STORM WATER MANAGEMENT</b>				
NS-1	Water Conservation Practices	X		6
NS-8	Vehicle and Equipment Cleaning	X		6
NS-9	Vehicle and Equipment Fueling	X		6
<b>WASTE MANAGEMENT AND MATERIAL CONTROL</b>				
TC-1	Stabilized Construction Entrance/Exit	X		5
WM-3	Stockpile Management	X		7
WM-4	Spill Prevention and Control	X		7
WM-5	Construction and Litter Debris Management	X		7
<b>SLOPE PROTECTION</b> Employ at least one BMP option				
SS-7	Geotextiles and Erosion Control Blankets		X	3
SS-9	Earth Dikes/ Drainage Swales & Lined Ditches		X	3
SS-11	Slope Drains		X	3
SC-5	Fiber Rolls		X	4
SC-6	Gravel Bag Berm		X	4
<b>STABILIZE DISTURBED AREAS</b> Employ at least one BMP option				
SS-13	Wind Erosion Control	X		3
SS-5	Soil Stabilizers		X	3
SS-3/SS-6/SS-8	Hydraulic/ Straw/ Wood Mulch		X	3
SS-7	Geotextiles and Erosion Control Blankets		X	3
SS-7	Hydroseeding	X <sup>(2)</sup>	X <sup>(2)</sup>	3

<sup>(1)</sup> See also Section 2.2.1. Not all minimum requirements may be applicable to every project. Applicability to a specific project shall be verified by the contractor or determined by NDOT. See Section 2.5 for Implementation Guidance.

<sup>(2)</sup> When specified



## 2.3 Definitions

### 2.3.1 Disturbed Soil Area (DSA)

Disturbed soil areas (DSAs) are areas of exposed, erodible soil that are within the construction limits and that result from construction activities. The following are not considered DSAs:

- Areas where soil stabilization, sediment control, highway planting, or slope protection are applied and associated drainage facilities are in place and functional.
- Roadways, construction roads, access roads or contractor's yards that have been stabilized by the placement of compacted sub-base or base material or paved surfacing.
- Areas where construction has been completed in conformance with the contract plans and permanent erosion control is in place and functional.
- Erosion control is considered functional when a uniform vegetative cover equivalent to 70 percent of the native background vegetation coverage has been established or equivalent stabilization measures have been employed.

### 2.3.2 Active Areas and Non-Active Areas

*Active Areas* are construction areas where soil-disturbing activities have already occurred and continue to occur or will occur during the ensuing 14 days.

*Non-Active Areas* are construction areas (formerly active areas) that will be idle for at least 14 days.

The Contractor shall conduct a review of the existing active areas on a regular basis to determine if a non-active status should be applied to some DSAs.

### 2.3.3 Slope Length and Benches

*Slope length* is measured or calculated along the continuous inclined surface. Each discrete slope is between one of the following: top to toe, top to bench, bench to bench, and bench to toe.

*Benches* are drainage facilities that intercept surface flow and convey the resulting concentrated flow away from a slope. For the purpose of determining slope lengths, fiber rolls or other appropriate BMPs (used for temporary sediment control) can be considered equivalent to a bench.

### 2.3.4 Rainy Season

The average rainfall in Nevada varies greatly from region to region. To account for the various rainfall patterns (time frame, intensities, and amounts) the State is separated into several rainy seasons. Shown in Figure 2-1 is a map identifying the

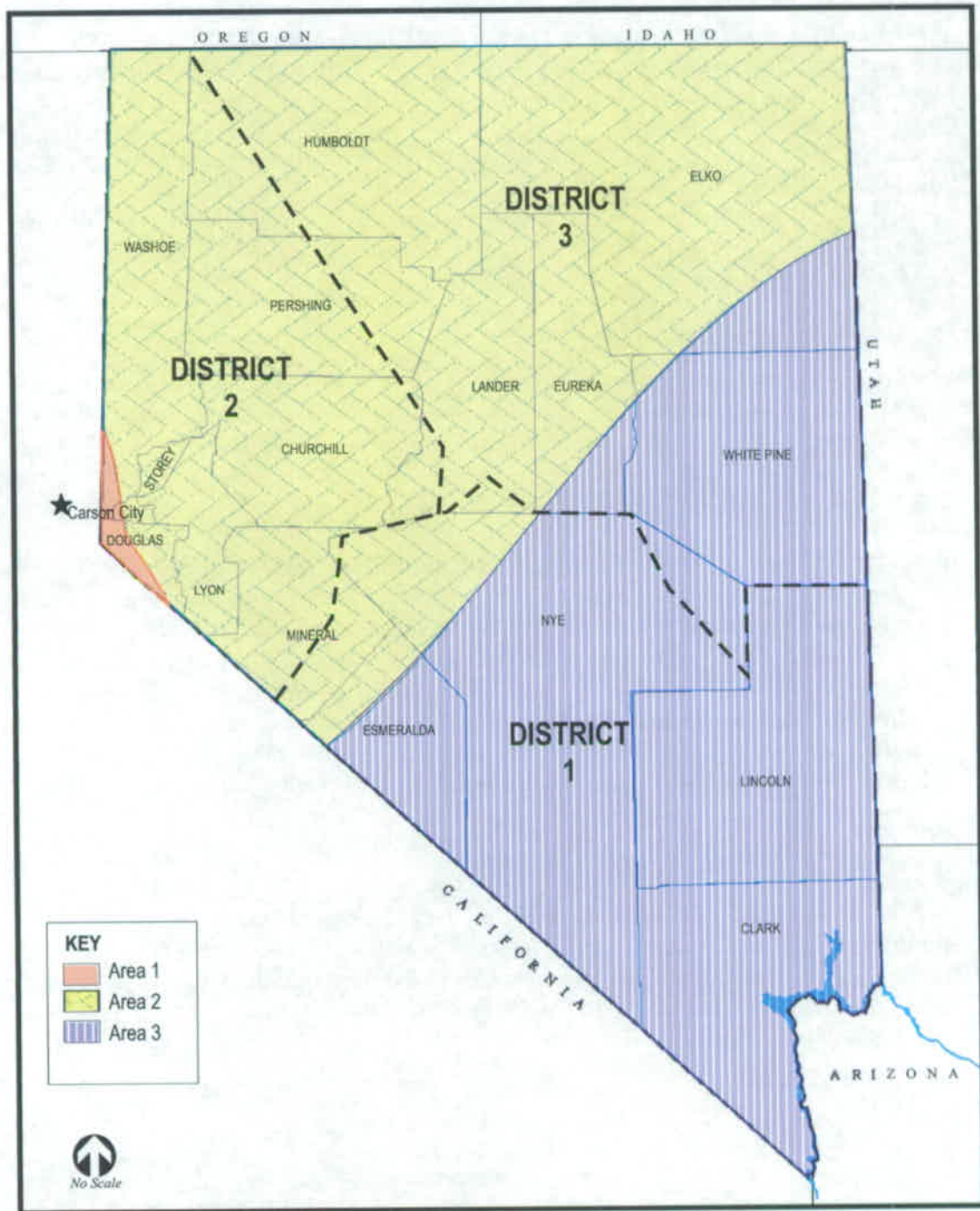
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rainy seasons throughout the State. These rainy seasons are used to identify the appropriate level of soil stabilization and sediment control protection.

Area 1 is usually subject to major floods in the late fall and winter because of "spillover" from the rain and snowstorms in the western Sierras; this area also includes high elevations and is prone to snow storms. Area 2 is affected by winter storms and snowmelt runoff while Area 3 is subject to influence by rainstorms from the Gulf of Mexico or the Pacific Ocean. The major flood season in Area 3 is during the summer months of thunderstorm activity.





**Figure 2-1**  
**Designation of Homogeneous Rainfall Areas**

## **2.4 Selection of Temporary Soil Stabilization Controls**

There are many methods available to provide soil stabilization. Criteria were developed to allow for comparison and differentiation among the product types that are available. These criteria include installed cost, erosion control effectiveness, drying time, and others.

For some criteria, values have been assigned by characteristics: an example would be mode of application (e.g., hydraulic seeder, water truck, and hand labor). For other criteria, actual numeric values should be considered based on available data, such as drying time in hours. Refer to Table 2-2 for a summary of selection criteria information and ratings for temporary soil stabilization BMPs.

### **2.4.1 Antecedent Moisture**

This criterion relates to the effect of existing soil moisture on the effectiveness of a soil stabilization method. While antecedent soil moisture conditions can have an effect on the performance of some methods, (e.g., hydraulic soil stabilizers, temporary seeding) other methods, such as erosion control blankets or impervious covers, are not affected, except perhaps in their ease of installation.

Suppliers of manufactured soil stabilization products affected by antecedent soil moisture specify the conditions under which their products are to be applied. For example, some products clearly benefit from having the soil "pre-wetted" before application of the hydraulic soil stabilizer and as a result, some manufacturers recommend application of water by itself as a first step. Conversely, the binding action of some adhesives on soil particles (and thereby their erosion control effectiveness) can be affected by excessive soil moisture. Therefore, some manufacturers recommend that their products not be applied when the soil is visibly saturated or when standing water is present.

### **2.4.2 Availability**

A critical aspect of product specification and use is whether or not a soil stabilization product is readily available. While local sources may be preferable, the seasonal nature of soil stabilization work can create localized shortages of materials. In these cases, usually the material that can be delivered to the job most quickly is the material that is selected for application.



**Table 2-2  
Temporary Soil Stabilization Criteria Matrix**

CLASS	TYPE	Antecedent Moisture	Availability	Ease of Clean-Up	Installed Cost per hectare (Ha)	Erosion Control Effectiveness (%)	Degradability	Length of Drying Time (hrs)	Time to Effectiveness (days)	Longevity	Mode of Application	Residual Impact	Native	Runoff Effect	
Straw Mulch	Wheat Straw	D	S	H	\$5,200	90-95	B	0	1	M	L/M	M		+	
	Rice Straw	D	S	H	\$5,200	90-95	B	0	1	M	L/M	M		+	
Wood Fiber Mulch	Wood Fiber	D	S	H	\$2,200	50-60	B	0-4	1	M	H	L		+	
Recycled Paper Mulch	Cellulose Fiber	D	S	H	\$2,100	50-60	B	0-4	1	S	H	L		+	
Bonded Fiber Matrix	Biodegradable	D	S	H	\$13,600	90-95	B	12-18	1	M	H	M		+	
Biodegradable	Jute Mesh	D	S	H	\$16,000	65-70	B		1	M	L	M		+	
	Curled Wood Fiber	D	S	H	\$26,000	85-90	P/B		1	M	L	M		+	
	Straw	D	S	H	\$22,000	85-90	P/B		1	M	L	M		+	
	Wood Fiber	D	S	H	\$22,000	85-90	P/B		1	M	L	M		+	
	Coconut Fiber	D	S	H	\$32,000	90-95	P/B		1	L	L	M		+	
	Coconut Fiber Mesh	D	S	H	\$77,000	85-90	B		1	L	L	M		+	
	Straw Coconut Fiber	D	S	H	\$27,000	90-95	P/B		1	L	L	M		+	
Non-Biodegradable	Plastic Netting	D	M	H	\$5,000	<50	P		1	L	L	H		+	
	Plastic Mesh	D	M	H	\$8,000	75-80	P		1	L	L	H		+	
	Synthetic Fiber with Netting	D	M	H	\$86,000	90-95	P		1	L	L	H		+	
	Bonded Synthetic Fibers	D	M	H	\$121,000	90-95	P		1	L	L	H		+	
	Combination with Biodegradable	D	M	H	\$79,000	85-90	P		1	L	L	H		+	
High-Density	Ornamentals		S-M	H	\$1000 - \$4000	50-60			28	M-L	H	L-M	N/E	+	
	Turf species		S	H	\$900	50-60			28	L	H	M-H	N/E	+	
	Bunch grasses		S-M	H	\$750 - \$3200	50-60			28	L	H	L-M	N	+	
Fast-Growing	Annual		S	H	\$900 - \$1,600	50-60			28	L	H	L-H	N/E	+	
	Perennial		S	H	\$800 - \$2000	50-60			28	L	H	M	N/E	+	
Non-Competing	Native		S-M	H	\$700 - \$4000	50-60			28	L	H	L-M	N	+	
	Non-Native		S-M	H	\$1000 - \$1200	50-60			28	L	H	L-H	E	+	
Sterile	Cereal Grain		S	H	\$1,200	50-60			28	L	H	L	E	+	
Plastic	Rolled Plastic Sheeting		S		\$17,000	100	P		1	M	L	H		-	
	Geotextile (Woven)		S		\$14,800	90-95	P		1	M	L	H		-	
(PBS) Plant Material	Guar	D	S	H	\$1,000	80-85	B	12-18	Same as Length of Drying Time.		S	B	L	0/+	
Based- Short Lived	Psyllium	P	S	H	\$1,000	25-35	B	12-18			M	B	L		0
	Starches	D	S	H	\$1,000	25-30	B	9-12			S	H	L		0
(PBL) Plant Material Based- Long Lived	Pitch/ Rosin Emulsion	D	S	M	\$3,000	60-75	B	19-24			M	B	M		-
(PEB) Polymeric	Acrylic polymers and copolymers	D	S	M	\$3,000	35-70	P/C	19-24			L	B	M		+/-
Emulsion Blends	Methacrylates and acrylates	D	M	M	\$1,000	35-40	P/C	12-18			S	W	L		0/+
	Sodium acrylates and acrylamides	D	M	M	\$1,000	20-70	P/C	12-18			S	H	L		+/-
	Polyacrylamide	D	M	M	\$1,000	55-65	P/C	4-8			M	H	L		0/+
	Hydro-colloid polymers	D	M	H	\$1,000	25-40	P/C	0-4			M	H	L		0/+
(PRB) Petroleum/ Resin-Based Emulsions	Emulsified Petroleum Resin	D	M	L	\$3,000	10-50	P/C	0-4			M	B	M		0/-
(CBB) Cementitious Based Binders	Gypsum	D	S	M	\$2,000	75-85	P/C	4-8			M	H	L		-
= not applicable for category, class or type															

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**Table 2-2 (continued)**  
**Temporary Soil Stabilization Criteria Matrix**

Antecedent Moisture	D P	Soil should be relatively dry before application Soil should be pre-wetted before application
Availability	S M	A short turn-around time between order and delivery, usually 3-5 days A moderate turnaround time, between 1-2 weeks
Ease of Clean-Up	L M H	Require pressure washing, a strong alkali solution, or solvent to clean up Requires cleanup with water while wet; more difficult to clean up once dry May be easily removed from equipment and overspray areas by a strong stream of water
Installed Cost		Dollars per hectare
Erosion Control Effectiveness		Percent reduction in soil loss over bare soil condition.
Degradability	C P B	Chemically degradable Photodegradable Biodegradable
Length of Drying Time		Estimated hours
Time to Effectiveness		Estimated days
Longevity	S M L	1 - 3 months 3 - 12 months > than 12 months
Application Mode	L W H B M	Applied by hand labor Applied by water truck Applied by hydraulic mulcher Applied by either water truck or hydraulic mulcher Applied by a mechanical method other than those listed above (e.g., straw blower)
Residual Impact	L M H	Projected to have a low impact on future construction activities Projected to have a moderate impact on future construction activities Projected to have a significant impact on future construction activities
Native	N E	Plant or plant material native to the State of Nevada Exotic plant not native to the State of Nevada
Runoff Effect	+ 0 -	Runoff is decreased over baseline (bare soil) No change in runoff from baseline Runoff is increased over baseline

Source: California Department of Transportation (CALTRANS) Storm Water Quality Handbooks, Construction Site Best Management Practices Manual, Appendix B, August 2002.



### **2.4.3 Ease of Clean-Up**

This criterion applies primarily to the hydraulically applied soil stabilization materials, but there may be clean-up issues associated with some of the other categories as well (e.g., packaging materials, disposal of excess product, etc).

All of the approved hydraulic soil stabilization products are typically applied using water as a carrier, and to varying degrees, these products can be removed from application machinery and overspray areas with the application of clean water as well. However, cleaning must occur before the material sets or dries, otherwise stronger cleaning solutions of detergent, a strong alkali solution, or a petrochemical solvent must be used.

A prudent contractor will take precautions when working with hydraulic products that have some clean-up limitations, and must follow the BMPs in the SWPPP for cleaning of equipment on site. Regardless of which approach is used for temporary soil stabilization, site clean up can be problematic due to the following:

- Added time to dispose of waste materials
- Added time to clean hydraulic equipment before the material sets or dries
- Additional quantities of water needed for cleaning operations
- Impact of quick-setting materials on overspray areas such as sidewalks, roads, vehicles
- Contractor resistance to products that require excessive clean-up
- Additional operation and maintenance costs included in contractor's bid.

### **2.4.4 Installed Cost**

The estimated installed cost (the cost of the material itself, plus the cost associated with its installation) has a value that corresponds to cost in dollars per hectares, which are used for estimating and bidding. This approach allows for the direct comparison of approaches.

### **2.4.5 Erosion Control Effectiveness**

This criterion measures the ability of a particular product to reduce soil erosion relative to the amount of erosion measured for bare soil. Erosion control effectiveness is described as a percentage the erosion would be reduced as compared to an untreated or control condition.

### **2.4.6 Degradability**

Degradability relates to the method by which the chemical components of a soil stabilization product are degraded over time. As might be expected, the way in which a product degrades is related to longevity, which is another selection criterion.

Both degradability and longevity are sometimes key issues in temporary soil stabilization and long-term erosion and sediment control planning.

Soil properties, climate, existing vegetation as well as slope aspect contribute to the degradation of soil stabilization materials. Knowing something about the physical and chemical properties of a product and how these characteristics might interact with site conditions is important when selecting a particular material.

#### **2.4.7 Length of Drying Time**

Not all materials require drying time, and the drying criterion may be used to differentiate categorical approaches as well as a final screen for the various types of materials within a class of approaches.

Determining when a soil stabilization material is dry or completely cured is a subjective exercise that relies a great deal on manufacturer-published information. In setting standards for this criterion, where drying or curing time is necessary for a particular method to become erosion control effective, manufacturers' recommendations have been followed.

#### **2.4.8 Time to Effectiveness**

Not all soil stabilization products are immediately effective in controlling erosion: some take time to dry (e.g., hydraulic soil stabilizers) and others take time to grow (e.g., temporary seeding). However, when some treatments are applied (e.g., rolled erosion control products, plastic sheeting, and straw mulch) they are immediately effective.

#### **2.4.9 Longevity**

This criterion simply considers the time that a soil stabilization product maintains its erosion control effectiveness.

#### **2.4.10 Mode of Application**

The mode of application criterion refers to the type of labor or equipment that is required to install the product or technique.

#### **2.4.11 Residual Impact**

This criterion relates to the impact that a particular practice might have on construction activities once they are resumed on the area that was temporarily stabilized. Some examples include:

- Temporary vegetation covers or standard biodegradable mulches might create problems with achieving final slope stability or compaction due to their organic content, and therefore would require removal and disposal.
- Applications of straw or hay fibers might keep soil from drying out as quickly as it might if it was bare.



- Plastic sheeting, netting or materials used in a soil stabilization product might last longer than needed on or in the soil.

### **2.4.12 Native**

This criterion relates primarily to selection of plant materials and is important from the standpoint of environmental compatibility and competitiveness.

### **2.4.13 Runoff Effect**

This criterion measures the effect that a particular soil stabilization product has on the production of storm water runoff. Similar to the erosion control effectiveness criterion, runoff from an area protected by a particular product may be compared to the amount of runoff measured for bare soil and is presented in the matrix as a percentage of the runoff that would occur in an untreated, or control condition.

## **2.5 Temporary Soil Stabilization and Sediment Control Implementation Guidance**

Storm water pollution control requirements are intended to be implemented on a year-round basis at an appropriate level. The requirements must be implemented in a proactive manner during all seasons while construction is ongoing.

Nevada has varied rainfall patterns throughout the state; therefore, the appropriate level of BMP implementation will also vary throughout the state. The guidance for temporary sediment controls and soil stabilization BMPs specified in this section are based on rainfall patterns (time frames, intensities, and amounts), general soil types, seasons, slope inclinations and slope lengths.

Appropriate storm water pollution control includes the implementation of an effective combination of both soil stabilization and sediment controls. This section describes both general principles and specific guidance for selecting and implementing temporary soil stabilization and sediment control BMPs.

Sections 2.5.1, 2.5.2, and 2.5.3 provide key principles for preventing erosion on construction sites. Sections 2.5.4 and 2.5.5 provide the specific guidance for selecting and implementing temporary soil stabilization and sediment control BMPs to manage disturbed soil areas.

### **2.5.1 Scheduling**

Construction scheduling must consider the amount and duration of soil exposed to erosion by wind, rainfall, runoff, and vehicle tracking, and must seek to minimize disturbed soil area in the rainy season. A schedule must be prepared that shows the sequencing of construction activities with the installation and maintenance of soil stabilization and sediment control BMPs. See Section 3, BMP SS-1, in this manual for BMP details.



### **2.5.2 Preservation of Existing Vegetation**

Preserving existing vegetation to the maximum extent possible and for as long as possible on a construction site reduces or eliminates erosion in those areas. To facilitate this practice, on a year-round basis, temporary fencing must be provided prior to commencement of clearing and grubbing operations or other soil-disturbing activities in areas where no construction activity is planned or construction will occur at a later date. See BMP SS-2, Preservation of Existing Vegetation, for BMP details.

### **2.5.3 Storm Water Run-on and Concentrated Flows**

The diversion of storm water run-on and conveyance of concentrated flows must be considered in determining the appropriateness of the BMPs chosen. BMPs to divert or manage concentrated flows in a non-erodible fashion may be required on a project-by-project basis to divert off-site drainage through or around the construction site or to properly manage construction site storm water runoff. See BMPs SS-9, Earth Dikes, Drainage Swales and Lined Ditches; SS-10, Outlet Protection/Velocity Dissipation Devices; and SS-11, Slope Drains for BMP details.

### **2.5.4 Disturbed Soil Area Management**

The DSA management guidelines are based on rainfall patterns (time frames, intensities, and amounts), general soil types, seasons, slope inclinations, and slope lengths. All of these factors are considered in developing the appropriate levels of soil stabilization and sediment control, and will be considered by the Engineer when directing specific site-by-site actions.

#### **2.5.4.1 Disturbed Soil Area Size Limitations**

Limiting the amount of disturbed soil is a critical component in conducting an effective storm water management program. Contract Special Provisions may specify limits of DSA. The Engineer has the option of increasing the limit of the total DSA during the rainy season beyond five (5) acres if appropriate construction BMPs and an implementation plan are included in an accepted SWPPP.

#### **2.5.4.2 Disturbed Soil Area Protection by Temporary Soil Stabilization and Temporary Sediment Controls**

To account for rainfall patterns (time frames, intensities, and amounts) and to a lesser extent general soil type differences, the State has been divided into three areas requiring common protection requirements. These rainfall areas are described in Table 2-3. The specific temporary soil stabilization and sediment control BMPs for DSA protection in each area are determined from Tables 2-4 and 2-5 (for non-active disturbed soil areas and active disturbed soil areas, respectively). The slope length and slope inclination are the most important criteria for soil stabilization and sediment control requirements, as these factors have the largest potential impact on the erosion rate. As indicated on these tables, the temporary soil stabilization and sediment controls at a construction site will increase with increasing slope length and slope inclination combination.



DSAs shall be protected as follows:

- Temporary BMPs (as required in Table 2-4) shall be implemented on non-active DSAs within 14 days from the cessation of soil-disturbing activities or one day prior to the onset of precipitation, whichever occurs first.
- Temporary BMPs for active DSAs (as required in Table 2-5) shall be implemented prior to the onset of precipitation and throughout each day for which precipitation is forecasted.
- For non-active DSAs, limit the erosive effects of storm water flow on slopes by implementing BMPs such as fiber rolls or gravel bag berms to break up the slope lengths as follows:
  - Slope inclination 4:1 and flatter: BMPs shall be placed on slopes at intervals no greater than 20 ft.
  - Slope inclination between 4:1 and 2:1: BMPs shall be placed on slopes at intervals no greater than 15 ft.
  - Slope inclination 2:1 or greater: BMPs shall be placed on slopes at intervals no greater than 10 ft.
- For non-active DSAs, permanent erosion control shall be applied to areas deemed substantially complete during the project's defined seeding window.
- Provide construction site BMPs in addition to those specified in Tables 2-3 and 2-4 to convey concentrated flows in a non-erodible fashion.

Table 2-3 AREA DEFINITIONS	
AREA	DESCRIPTION
1	District 2 in the following areas: Along the Sierra Nevada from the westerly edge of Reno south through Douglas County
2	District 1, 2, and 3 (except within Area 1) North of line running from western edge of Esmeralda County northeasterly above Tonopah, south of Eureka to the eastern state line near Wendover.
3	District 1 and 3 (except within Area 2) South of line running from western edge of Esmeralda County northeasterly above Tonopah, south of Eureka to the eastern state line near Wendover.

**Table 2-4**  
**Required Combination of Temporary Soil Stabilization**  
**and Temporary Sediment Barriers <sup>(5) (6)</sup>**  
**NON-ACTIVE DISTURBED SOIL AREAS**

SEASON	AREA	TEMPORARY BMP	SLOPE <sup>(1)</sup>			
			≤ 20:1	> 20:1 ≤ 4:1	> 4:1 ≤ 2:1	> 2:1
RAINY	1	SOIL STABILIZATION <sup>(4)</sup>	X	X	X	X
		SEDIMENT BARRIER <sup>(4)</sup>	X	X	X	X
		SEDIMENT BASIN <sup>(2)</sup>		X	X	X
	2	SOIL STABILIZATION <sup>(4)</sup>	X	X	X	X
		SEDIMENT BARRIER		X	X	X
		SEDIMENT BASIN				X
	3	SOIL STABILIZATION <sup>(4)</sup>	X	X	X	X
		SEDIMENT BARRIER		X	X	X
		SEDIMENT BASIN				X
NON - RAINY	1	SOIL STABILIZATION <sup>(4)</sup>	X <sup>(3)</sup>	X <sup>(3)</sup>	X	X
		SEDIMENT BARRIER		X <sup>(3)</sup>	X	X
		SEDIMENT BASIN				
	2	SOIL STABILIZATION				
		SEDIMENT BARRIER				X
		SEDIMENT BASIN				
	3	SOIL STABILIZATION				
		SEDIMENT BARRIER				X
		SEDIMENT BASIN				

<sup>(1)</sup> Unless otherwise noted, the temporary BMP is required for the slope inclinations indicated on slope lengths greater than 10 ft. The maximum slope length is 100 ft. for slope inclinations between 20:1 and 2:1 and 50 ft. for steeper slopes.

<sup>(2)</sup> Required in addition to the temporary sediment barrier, where feasible. Feasibility will depend on site-specific factors such as available right-of-way within the project limits, topography, soil type, disturbed soil area within watershed, and climate conditions.

<sup>(3)</sup> Implementation of controls not required except at least 24 hours prior to all predicted rain events.

<sup>(4)</sup> The indicated temporary BMP is required on all slope lengths.

<sup>(5)</sup> Temporary sediment barrier BMPs are equivalent to what are sometimes referred to as perimeter systems. The intent is to provide a barrier to the transport of sediment at the downslope edge of soil disturbed areas.

<sup>(6)</sup> Permanent erosion control seeding shall be applied to all non-active areas deemed substantially complete.



**Table 2-5**  
**Required Combination of Temporary Soil Stabilization**  
**Temporary Sediment Barriers**  
**ACTIVE DISTURBED SOIL AREAS <sup>(3)</sup>**

SEASON	AREA	TEMPORARY BMP	SLOPE <sup>(1)</sup>		
			≤ 20:1	> 20:1 ≤ 2:1	> 2:1
RAINY	1	SOIL STABILIZATION		X	X
		SEDIMENT BARRIER <sup>(4)</sup>	X	X	X
		SEDIMENT BASIN <sup>(2)</sup>		X	X
	2	SOIL STABILIZATION			X <sup>(5)</sup>
		SEDIMENT BARRIER		X	X
		SEDIMENT BASIN <sup>(2)</sup>			X <sup>(5)</sup>
	3	SOIL STABILIZATION			X <sup>(5)</sup>
		SEDIMENT BARRIER		X	X
		SEDIMENT BASIN <sup>(2)</sup>			X <sup>(5)</sup>
NON-RAINY	1	SOIL STABILIZATION			
		SEDIMENT BARRIER		X	X
		SEDIMENT BASIN <sup>(2)</sup>			X <sup>(5)</sup>
	2	SOIL STABILIZATION			
		SEDIMENT BARRIER			
		SEDIMENT BASIN			
	3	SOIL STABILIZATION			
		SEDIMENT BARRIER			
		SEDIMENT BASIN			

<sup>(1)</sup> Unless otherwise noted, the BMP is required for the slope inclinations indicated on slope lengths greater than 10 ft.

<sup>(2)</sup> Required in addition to the temporary sediment barrier, where feasible. Feasibility will depend on site-specific factors such as available right-of-way within the project limits, topography, soil type, disturbed soil area within watershed, and climate conditions.

<sup>(3)</sup> Implementation of soil stabilization controls not required except prior to predicted rain.

<sup>(4)</sup> The indicated temporary BMP required on all slope lengths.

<sup>(5)</sup> The indicated temporary BMP required on slope lengths greater than 50 feet.

### **2.5.5 Basins**

The practices described herein are typical of those that will be implemented on a project-by-project basis. However, it is important to note that there will be instances where project and site conditions require deviation from the BMPs and the descriptions provided in this manual.

For instance, the proposed implementation of sediment basins (see BMP SC-2, Sediment Basin) is a new commitment that has not been incorporated into existing designs. In addition, the nature of linear projects and constrained rights-of-way inherent to NDOT work may prohibit the use of sediment basins at some locations on certain projects and on some projects altogether.

Implementation of sediment basins will be considered on a project-by-project basis. NDOT is committed to refining the sediment basin implementation criteria during the term of the General Permit while implementing the sediment basins on projects as practicable.

### **2.5.6 Stockpile Management**

Soil stabilization and sediment control requirements, as they apply to stockpiles of various materials, are presented in BMP WM-3, Stockpile Management.

## **2.6 Guidance for Implementation of Other BMPs**

### **2.6.1 Mobile Operations**

Mobile operations common to the construction of a project include asphalt recycling, concrete mixing, crushing and the storage of materials. BMPs shall be implemented year-round, as appropriate, to control the individual situations these mobile operations can create.

### **2.6.2 Wind Erosion Controls**

Wind erosion controls shall be implemented year-round for all disturbed soils on the project site that are subject to wind erosion and when significant wind and dry conditions are anticipated during construction of the project. See BMP WE-1, Wind Erosion, for BMP details.

The Special Provisions may also require issuance of Air Quality Permits. In Nevada, air quality is regulated by the NDEP or, within Washoe and Clark Counties, by each county's Air Quality Management Divisions. The Contractor is responsible for obtaining any air quality-related permits and developing any plans that may be required by the regulatory agencies.

#### **2.6.2.1 NDEP**

NDEP requires a Surface Area Disturbance Permit if land disturbance equals or exceeds five (5) acres. If the disturbed soil area exceeds twenty (20) acres, a dust control plan must also be submitted.



#### **2.6.2.2 Clark County Department of Air Quality Management (AQMD)**

In Clark County, the following construction activities require a Dust Control Permit:

- Soil disturbing or construction activity greater than or equal to one-quarter acre;
- Mechanized trenching greater than or equal to 100 feet in length; or
- Mechanical demolition of any structure larger than or equal to 1,000 ft<sup>2</sup>.

A Dust Mitigation Plan is required for all projects and a Site Specific Dust Mitigation Plan is required for sites greater than 10 acres. Construction site superintendent(s), foremen and other designated on-site representatives, as well as the water truck/pull drivers are required to complete the Clark County Dust Control Class.

Clark County Dust Control Permits require explicit payment for temporary and permanent dust control in contract estimates. To comply with this requirement NDOT has created standard line items for these controls to be included in the cost estimates for every project that would disturb the soil.

#### **2.6.2.3 Washoe County District Health Department Air Quality Management Agency (AQMA)**

In Washoe County a Dust Control Plan is required for projects disturbing more than one acre of soil.

### **2.6.3 Tracking Controls**

Tracking controls shall be implemented year-round, as needed, to reduce the tracking of sediment and debris from the construction site. At a minimum, entrances and exits shall be inspected daily, and controls implemented as needed. See Section 5 of this manual for BMP details.

### **2.6.4 Non-Storm Water and Waste Management and Materials Pollution Controls**

The objective of the non-storm water and waste management and materials pollution controls is to reduce the discharge of materials other than storm water to the storm water drainage system or to receiving waters. These controls shall be implemented year-round for all applicable activities, material usage, and site conditions. Sections 7 and 8 of this manual provide guidance on implementation of BMPs related to the specific activity being conducted.

## **2.7 BMP Inspections**

The BMPs deployed on construction sites will be inspected on a frequency as described below. Improperly installed or damaged practices shall be corrected immediately, or by a later date and time if requested by the Contractor and approved by the Engineer in writing, but not later than the onset of subsequent rain events. Inspections of the construction site for construction site BMPs are conducted as follows:

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- Within 24 hours of the end of a storm event of 0.5 in. or greater;
- At least once every seven (7) calendar days;
- As specified in the project Special Provisions and/or SWPPP; and/or
- As directed by the Engineer.



## Section 3

# Temporary Soil Stabilization Best Management Practices

### 3.1 Temporary Soil Stabilization

Temporary soil stabilization consists of preparing the soil surface and applying one of the best management practices (BMPs) shown in Table 3-1, or combination thereof, to disturbed soil areas. Temporary soil stabilization shall be applied to disturbed soil areas of construction projects in conformance with the criteria presented in Section 2, Selecting and Implementing Construction Site BMPs, of this Manual.

Table 3-1 TEMPORARY SOIL STABILIZATION BMPs	
ID	BMP NAME
SS-1	Scheduling
SS-2	Preservation of Existing Vegetation
SS-3	Hydraulic Mulch
SS-4	Hydroseeding
SS-5	Soil Stabilizer
SS-6	Straw Mulch
SS-7	Geotextiles, Plastic Covers, & Erosion Control Blankets/Mats
SS-8	Wood Mulching
SS-9	Earth Dikes/Drainage Swales & Lined Ditches
SS-10	Outlet Protection/Velocity Dissipation Devices
SS-11	Slope Drains
SS-12	Streambank Stabilization
SS-13	Wind Erosion Control

Temporary soil stabilization also includes concentrated flow conveyance controls, which consist of a system of measures or BMPs that are used alone or in combination to intercept, divert, convey and discharge concentrated flows with a minimum of soil erosion, both on-site and downstream (off-site). Temporary concentrated flow conveyance controls may be required to direct run-on around or through the project in a non-erodible fashion. Temporary concentrated flow conveyance controls include the following BMPs:

*Section 3*  
*Temporary Soil Stabilization Best Management Practices*

- Earth Dikes/Drainage Swales & Lined Ditches
- Outlet Protection/Velocity Dissipation Devices
- Slope Drains

The remainder of this Section shows the working details for each of the temporary soil stabilization BMPs.



# Scheduling

**SS-1**

Adapted from Caltrans Construction Site BMPs

JANUARY				
MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
		1	2 NTP MOBILIZATION	3
			9	10 Grading
6 Install erosion & sediment control measures	7	8 Land clearing	15	16
12	13	14	22	23



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

### Definition and Purpose

This best management practice (BMP) involves developing, for every project, a schedule that includes sequencing of construction activities with the implementation of construction site BMPs such as temporary soil stabilization (erosion control) and temporary sediment controls measures. The purpose is to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff and vehicle tracking, and to perform the construction activities and control practices in accordance with the planned schedule.

### Appropriate Applications

Construction sequencing shall be scheduled to minimize land disturbance for all projects during the rainy and non-rainy season. Appropriate BMPs shall be implemented during both rainy and non-rainy seasons. Section 2.3.4 provides a description of the Nevada rainy season.

### Limitations

None identified.

### Standards and Specifications

- Developing a schedule and planning the project are the very first steps in an effective storm water program. Plan the project and develop a schedule or to layout the construction plan. Refer to Standard Specifications Section 108. The schedule shall clearly show how the rainy season relates to soil-disturbing and re-stabilization activities. The construction schedule shall be incorporated into the Storm Water Pollution Prevention Plan (SWPPP) or WPCP.
- The schedule shall include detail on the rainy season implementation and deployment of:
  - Temporary soil stabilization BMPs;

- Temporary sediment control BMPs;
  - Tracking control BMPs;
  - Wind erosion control BMPs;
  - Non-storm water BMPs; and
  - Waste management and materials pollution control BMPs.
- Schedule shall also include dates for significant long-term operations or activities that may have planned non-storm water discharges such as dewatering, sawcutting, grinding, drilling, boring, crushing, blasting, painting, hydro-demolition, mortar mixing, bridge cleaning, etc.
  - Schedule work to minimize soil-disturbing activities during the rainy season.
  - Work out the sequencing and timetable for the start and completion of each item such as site clearing and grubbing, grading, excavation, paving, pouring foundations, installing utilities, etc., to minimize the active construction area during the rainy season.
  - Schedule major grading operations for the non-rainy season when practical.
  - Temporarily stabilize non-active areas within 14 days from the cessation of soil-disturbing activities or one day prior to the onset of precipitation, whichever occurs first. See Standard Specification Section 107, "Protection and Restoration of Property and Landscape", Section 211, "Erosion Control" and General Permit section 1.B.b.2.
  - Monitor the weather forecast for rainfall.
  - When rainfall is predicted, adjust the construction schedule to allow the implementation of soil stabilization and sediment controls and sediment treatment controls on all disturbed areas prior to the onset of rain.
  - Be prepared year-round to deploy soil stabilization and sediment control and sediment treatment control practices as required by Section 2 of this Manual. Erosion may be caused during dry seasons by unseasonal rainfall, wind and vehicle tracking. Keep the site stabilized year-round, and retain and maintain rainy season sediment trapping devices in operational condition.
  - Sequence trenching activities so that most open portions are closed before new trenching begins.

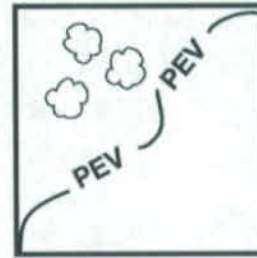
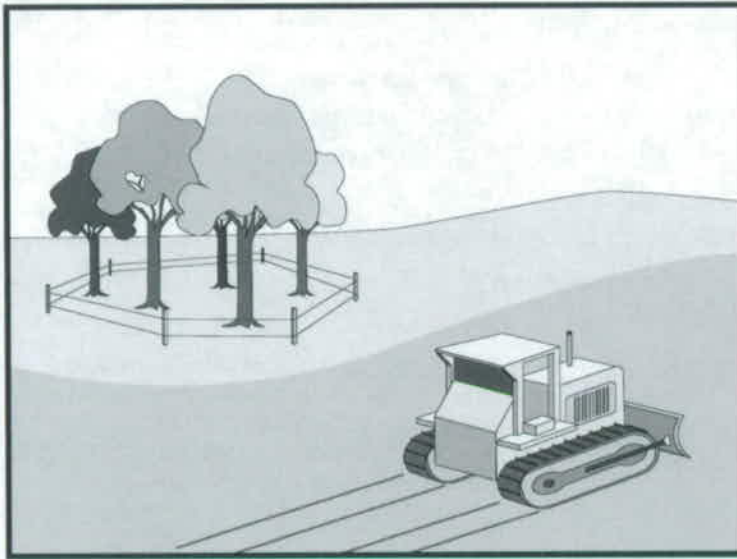


- Consider scheduling when establishing permanent vegetation (appropriate planting time for specified vegetation).
  - Apply permanent erosion control to areas deemed substantially complete during the project's defined seeding window.
  - Seeding should generally take place in the fall for spring germination. This provides a cold treatment required by many native species to break dormancy. Seeds that are in place during spring thaw will also have more favorable soil moisture conditions from winter precipitation. As discussed in the UNR Ecosystem Mapping and Revegetation Specifications Manual (Tueller et al, 2002), the fall seeding windows for Nevada conditions would be October 1 to January 1 for southern Nevada and August 15 to November 15 for the northern part of the state.
  - See Section 2 of this manual for additional information on rainy season in Nevada and BMP implementation guidance for different seasons and geographical areas.
- Maintenance and Inspection ■ Amend the schedule when changes are warranted.

# Preservation of Existing Vegetation

**SS-2**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

**Definition and Purpose** Preservation of existing vegetation is the identification and protection of desirable vegetation that provides erosion and sediment control benefits.

### Appropriate Applications

- Preserve existing vegetation at areas on a site where no construction activity is planned or will occur at a later date. Specifications for preservation of existing vegetation can be found in Standard Specifications, Sections 106 and 107 or plans or special provisions.
- On a year-round basis, protection or flagging shall be provided prior to the commencement of clearing and grubbing operations or other soil-disturbing activities in areas.
- No grading or disturbances shall occur in areas identified on the plans to be preserved, especially on areas designated on the plans as avoidance areas.

**Limitations** Protection of existing vegetation requires planning, and may limit the area available for construction activities.

### Standards and Specifications

#### Timing

- Preservation of existing vegetation shall be provided prior to the commencement of clearing and grubbing operations or other soil-disturbing activities in areas where no construction activity is planned or will occur at a later date.
- Preservation of existing vegetation shall conform to scheduling requirements set forth in the special provisions.
- Replace destroyed trees with comparable quality.



***Design and Layout***

- Mark areas to be preserved with temporary flagging fencing made of orange polypropylene that is stabilized against ultraviolet light. The temporary fencing shall be at least 3 ft. wide and shall have openings not larger than 2 in. by 2 in.
- Minimize the disturbed areas by locating temporary roadways to avoid stands of trees and shrubs and to follow existing contours to reduce cutting and filling.
- Consider the impact of grade changes to existing vegetation and the root zone.
- Trees to be removed should be shown on plans. A general schematic is provided on first page of this BMP, but plans should provide a site-specific design and layout.

***Installation***

- Construction materials, equipment storage, and parking areas shall be located where they will not cause root compaction.
- Keep equipment away from trees to prevent trunk and root damage.
- Maintain existing irrigation systems.
- When heavy equipment is to be working directly adjacent to trees provide 2x4 tree wraps.
- Employees and subcontractors shall be instructed to honor protective devices. No heavy equipment, vehicular traffic, or storage piles of any construction materials shall be permitted within the drip line of any tree to be retained. The drip line is the 7' perimeter from outside the trunk of a tree. Removed trees shall not be felled, pushed, or pulled into any retained trees. Fires shall not be permitted within 100 ft. of the drip line of any retained trees. Any fires shall be of limited size, and shall be kept under continual surveillance. No toxic or construction materials - including paint, acid, nails, gypsum board, chemicals, fuels, and lubricants - shall be stored within 50 ft. of the drip line of any retained trees, nor disposed of in any way which would injure vegetation. No washout areas near trees/fenced areas.

***Trenching and Tunneling***

- Trenching shall be as far away from tree trunks as possible, usually outside of the tree drip line or canopy. Curve trenches around trees to avoid large roots or root concentrations. If roots are encountered, consider tunneling under them. When trenching and/or tunneling near or under trees to be retained, tunnels shall be at least 18 in. below the ground surface, and not below the tree center to minimize impact on the

# Preservation of Existing Vegetation

**SS-2**

Adapted from Caltrans Construction Site BMPs

roots.

- Tree roots shall not be left exposed to air; they shall be covered with soil as soon as possible, protected, and kept moistened with wet burlap or peat moss until the tunnel and/or trench can be completed.
- The ends of damaged or cut roots shall be pruned.
- Trenches and tunnels shall be filled as soon as possible. Careful filling and tamping will eliminate air spaces in the soil, which can damage roots.
- After all other work is complete, fences and barriers shall be removed last. This is because protected trees may be destroyed by carelessness during the final cleanup and landscaping.

## Maintenance and Inspection

During construction, the limits of disturbance shall remain clearly marked at all times. Irrigation or maintenance of existing vegetation shall conform to the requirements in the landscaping plan. If damage to protected trees still occurs, maintenance guidelines described below shall be followed:

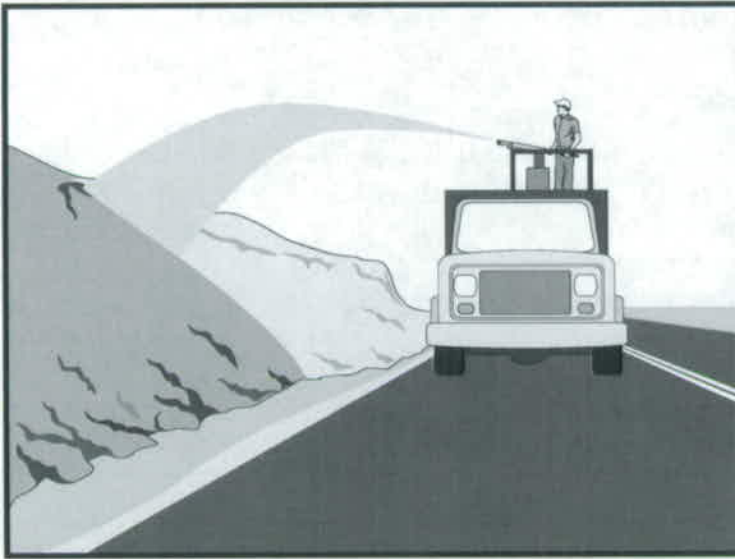
- If necessary, as determined by the Resident Engineer, a certified arborist will be hired at the contractor's expense to attend to serious tree injuries.
- Any damage to the crown, trunk, or root system of a retained tree shall be repaired immediately.
- Damage roots shall be immediately root pruned.
- If bark damage occurs, all loosened bark shall be cut back into the undamaged area, with the cut tapered at the top and bottom, and drainage provided at the base of the wood. Cutting of the undamaged area shall be as limited as possible. Performed by ASCA certified arborist.
- Soil that has been compacted over a tree's root zone shall be aerated by punching holes 12 in. deep with water injection soil probes. Holes shall be placed 18 in. apart throughout the area of compacted soil under the tree crown.
- Trees shall be fertilized in the late fall or early spring. Stressed or damaged broadleaf trees shall be fertilized to aid recovery. Consult with NDOT Landscape Architect.
- Fertilizer shall be applied to the soil over the feeder roots and in accordance with label instructions, but never closer than 3 ft. to the trunk. The fertilized area shall be increased by one-fourth of the crown area for conifers that have extended root systems.
- During construction, the Environmental Division shall be contacted to ensure that avoidance areas are protected.



# Hydraulic Mulch

SS-3

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

- |                                     |   |
|-------------------------------------|---|
| <b>Definition and Purpose</b>       | Hydraulic mulch consists of applying a mixture of cut or shaved wood fiber or a bonded fiber matrix, and a stabilizing emulsion or tackifier with hydro-mulching equipment, which temporarily protects exposed soil from erosion by raindrop impact or wind. This is one of five temporary soil stabilization alternatives to consider.   |
| <b>Appropriate Applications</b>     | Hydraulic mulch is applied to disturbed areas requiring temporary protection until permanent vegetation is established or disturbed areas that must re-disturbed following an extended period of inactivity.  |
| <b>Limitations</b>                  | <ul style="list-style-type: none"><li>■ Wood fiber hydraulic mulches are generally short-lived (only last a part of a growing season) and need 24 hours to dry before rainfall occurs to be effective.</li><li>■ Avoid use in areas where the mulch would be incompatible with future earthwork activities and would have to be removed.</li><li>■ Paper mulches are not permitted.</li></ul>   |
| <b>Standards and Specifications</b> | <ul style="list-style-type: none"><li>■ Prior to application, roughen embankment and fill areas by rolling with a crimping or punching type roller or by track walking. Track walking shall only be used where other methods are impractical.</li><li>■ Hydraulic matrices require 24 hours to dry before rainfall occurs to be effective unless approved by the Resident Engineer (RE).</li><li>■ Avoid mulch over-spray onto the traveled way, sidewalks, lined drainage channels, and existing vegetation.</li><li>■ Materials for wood fiber based hydraulic mulches and hydraulic matrices shall conform to Standard Specifications Section 726. Paper</li></ul> |

based hydraulic mulches alone shall not be used for temporary soil stabilization applications.

**Hydraulic Mulches**

- Wood fiber mulch is a component of hydraulic applications. It is typically applied at the rate of 2,000 to 4,000 lb/acre. This type of mulch is manufactured from wood or wood waste from lumber mills or from urban sources. Specifications for wood fiber mulch can be found in Standard Specifications Section 726.

**Hydraulic Matrices**

- Apply a wood fiber base layer mixed with acrylic polymers as binders. Apply as a liquid slurry using a hydraulic application machine (i.e., hydro-seeder) at the following minimum rates, or as specified by the special provisions, to achieve complete coverage of the target area: 750 lb/acre wood fiber mulch and 55 gal/acre of acrylic copolymer.

**Bonded Fiber Matrix**

- Bonded fiber matrix (BFM) is a hydraulically-applied system of fibers and adhesives that upon drying forms an erosion-resistant blanket that promotes vegetation, and prevents soil erosion. BFMs are typically applied at rates from 3,000 to 4,000 lb/acre based on manufacturer's recommendation (the biodegradable BFM is composed of materials that are 100% biodegradable. The binder in the BFM should also be biodegradable and should not dissolve or disperse upon re-wetting). Typically, biodegradable BFMs should not be applied immediately before, during, or immediately after rainfall if the soil is saturated. Depending on the product, BFMs typically require 12 to 24 hours to dry and become effective.

**Maintenance and Inspections**

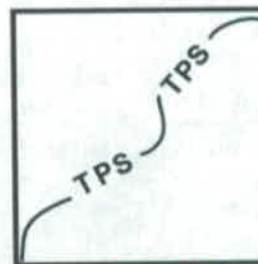
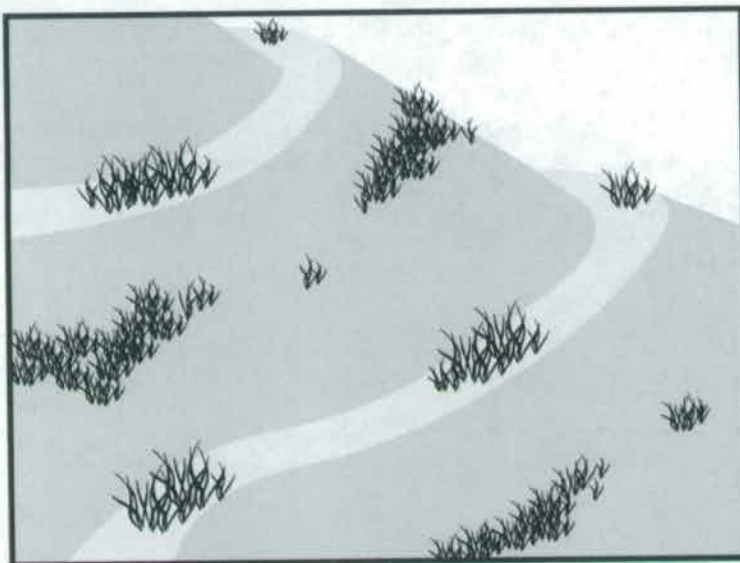
- Maintain an unbroken, temporary mulched ground cover throughout the period of construction when the soils are not being reworked. Inspect before expected rainstorms and repair any damaged ground cover and re-mulch exposed areas of bare soil.
- After any rainfall event, the Contractor is responsible for maintaining all slopes to prevent erosion.



# Hydroseeding

**SS-4**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

**Definition and Purpose** Hydroseeding typically consists of applying a mixture of wood fiber, seed, fertilizer, and stabilizing emulsion with hydro-mulch equipment, which temporarily protects exposed soils from erosion by water and wind. This is one of five temporary soil stabilization alternatives to consider. A list of additional soil stabilization BMPs can be found in Section 2 of this manual.

**Appropriate Applications** ■ Hydroseeding is applied on disturbed areas requiring temporary protection until permanent vegetation is established or disturbed areas that must be re-disturbed following an extended period of inactivity.

**Limitations** ■ Hydroseeding may be used alone only when there is sufficient time in the season to ensure adequate vegetation establishment and coverage to provide adequate erosion control. Otherwise, hydroseeding must be used in conjunction with a soil stabilizer or mulching, refer to BMP SS-5, Table 1 or other options.

■ Steep slopes are difficult to protect with temporary seeding.

**Standards and Specifications** ■ In order to select appropriate hydroseeding mixtures, an evaluation of site conditions shall be performed with respect to:

Soil conditions

Site topography

Season and climate

Vegetation types

Maintenance requirements

Sensitive adjacent areas

Water availability

Plans for permanent vegetation

- Selection of hydroseeding mixtures shall be approved by the Landscape Architect.
- For additional guidance seeding and revegetation in Nevada see *Mapping Ecosystems along Nevada Highways and the Development of Specifications for Vegetation Remediation* (UNR, 2002).

The following steps shall be followed for implementation:

- Seed mix shall comply with the Standard Specifications Section 726 and the project's special provisions.
- Hydroseeding can be accomplished using a multiple-step or one-step process; refer to the Special Provisions for specified process. The multiple-step process ensures maximum direct contact of the seeds to soil. When the one-step process is used to apply the mixture of fiber, seed, etc., the seed rate shall be increased to compensate for all seeds not having direct contact with the soil.
- Prior to application, roughen the slope, fill area, or area to be seeded with the furrows trending along the contours. See Standard Specifications Section 211, "Seeding and Fertilizing" and the "Slope Roughening/Terracing/Rounding" BMP (*NDOT Storm Water Quality Project Planning and Design Guide*).
- Apply a straw mulch to keep seeds in place and to moderate soil moisture and temperature until the seeds germinate and grow, refer to Standard Specifications Sections 211 and 726.
- All seeds shall be in conformance with the Standard Specifications Section 726. Each seed bag shall be delivered to the site sealed and clearly marked as to species, purity, percent germination, dealer's guarantee, and dates of test; provide the Resident Engineer with such documentation. The container shall be labeled to clearly reflect the amount of Pure Live Seed (PLS) contained. All legume seed shall be pellet-inoculated. Inoculant sources shall be species specific and shall be applied at a rate of 2 kg of inoculant per 100 kg of seed (2% inoculant by weight), refer to Standard Specifications Sections 211 and 726.
- Commercial fertilizer shall conform to the requirements of the Nevada Food and Agricultural Code. Fertilizer shall be pelleted or granular form.
- Follow-up applications shall be made as needed to cover weak spots, and to maintain adequate soil protection.



# Hydroseeding

**SS-4**

Adapted from Caltrans Construction Site BMPs

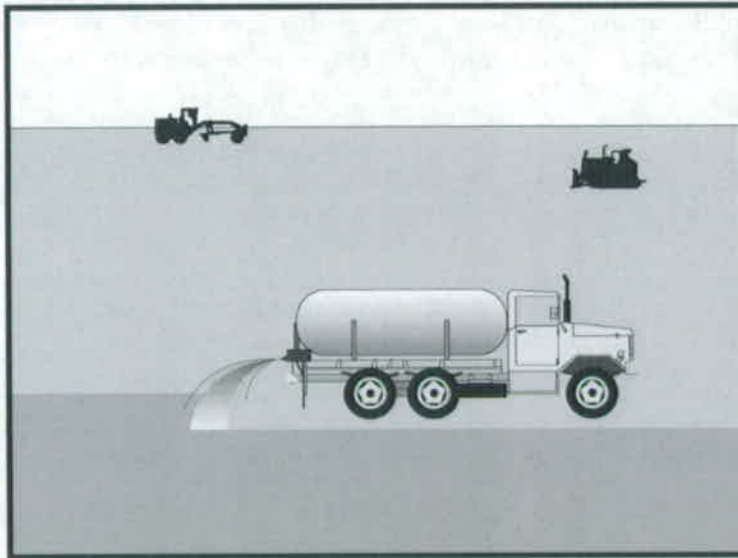
## Maintenance and Inspection

- Avoid over-spray onto the travel way, sidewalks, lined drainage channels and existing vegetation.
- In the Tahoe Basin seed mixes shall use only the approved species as listed in TRPA's Native and Adapted Plant List.
- All seeded areas shall be inspected for failures and re-seeded, fertilized, and mulched within the planting season, using not less than half the original application rates. Any temporary revegetation efforts that do not provide adequate cover must be reapplied at a schedule recommended by the Landscape Architect.
- After any rainfall event, the Contractor is responsible for maintaining all slopes to prevent erosion.

# Soil Stabilizers

**SS-5**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

**Definition and Purpose** Soil stabilizers consist of applying and maintaining a soil stabilizer to exposed soil surfaces. Soil stabilizers are materials applied to the soil surface to temporarily prevent water-induced erosion of exposed soils on construction sites. Soil stabilizers also provide temporary dust, wind and soil stabilization (erosion control) benefits. This is one of five temporary soil stabilization alternatives to consider.

**Appropriate Applications** Soil stabilizers are typically applied to disturbed areas requiring short-term temporary protection. Because soil stabilizers can often be incorporated into the work, they may be a good choice for areas where grading activities will soon resume. Application on stockpiles to prevent water and wind erosion.

- Limitations**
- Soil stabilizers are temporary in nature and may need reapplication.
  - Soil stabilizers require a minimum curing time until fully effective, as prescribed by the manufacturer, which may be 24 hours or longer. Soil stabilizers may need reapplication after a storm event.
  - Soil stabilizers will generally experience spot failures during heavy rainfall events. If runoff penetrates the soil at the top of a slope treated with a soil stabilizer, it is likely that the runoff will undercut the stabilized soil layer and discharge at a point further down slope.
  - Soil stabilizers do not hold up to pedestrian or vehicular traffic across treated areas.
  - Soil stabilizers may not penetrate soil surfaces made up primarily of silt and clay, particularly when compacted.



- Some soil stabilizers may have a deleterious effect on long-term landscaping. Use soil stabilizers in areas to be landscaped should be coordinated with NDOT landscaping.
- Some soil stabilizers may not perform well with low relative humidity. Refer to manufacturers' literature for humidity limitations. Under rainy conditions, some agents may become slippery or leach out of the soil.
- May not cure if low temperatures occur within 24 hours of application. Refer to manufacturers literature for temperature limitations.

**Standards and Specifications****General Considerations**

- Site-specific soil types will dictate appropriate soil stabilizers to be used.
- A soil stabilizer must be environmentally benign (non-toxic to plant and animal life), easy to apply, easy to maintain, economical, and shall not stain paved or painted surfaces, refer to Standard Specifications Section 211.
- Some soil stabilizers are compatible with existing vegetation.
- Performance of soil stabilizers depends on temperature, humidity, and traffic across treated areas.
- Avoid over-spray onto the traveled way, sidewalks, lined drainage channels, and existing vegetation.

**Selecting a Soil Stabilizer**

Properties of common soil stabilizers used for erosion control are provided on Table 1. Use Table 1 to select an appropriate soil stabilizer. Refer to Wind Erosion Control, SS-13, for dust control soil stabilizers.

Factors to consider when selecting a soil stabilizer include the following:

- Suitability to situation - Consider where the soil stabilizer will be applied, if it needs a high resistance to leaching or abrasion, and whether it needs to be compatible with any existing vegetation. Determine the length of time soil stabilization will be needed, and if the soil stabilizer will be placed in an area where it will degrade rapidly. In general, slope steepness is not a discriminating factor for the listed soil stabilizers.
- Soil types and surface materials - Fines and moisture content are key properties of surface materials. Consider a soil stabilizer's ability to penetrate, likelihood of leaching, and ability to form a surface crust on the surface materials. Soil information can be obtained from the project's geotechnical report or from a Natural Resources

Conservation District (NRCS) office or website.

- If working in Clark County, soil maps are available from the county.
- Frequency of application - The frequency of application can be affected by subgrade conditions, surface type, climate, and maintenance schedule. Frequent applications could lead to high costs. Application frequency may be minimized if the soil stabilizer has good penetration, low evaporation, and good longevity. Consider also that frequent application will require frequent equipment clean-up.

After considering the above factors, the soil stabilizers in Table 1 will be generally appropriate as follows:

### ***Plant-Material Based (Short Lived)***

*Guar:* Guar is a non-toxic, biodegradable, natural galactomannan-based hydrocolloid treated with dispersent agents for easy field mixing. It shall be applied at the rate of 10 to 15 lb per 1,000 gal of water, depending on application machine capacity. Recommended minimum application rates are as follows:

**Application Rates for Guar Soil Stabilizer**

Slope	Flat	4:1	3:1	2:1	1:1
lb/acre	40	45	50	60	70

*Psyllium:* Psyllium is composed of the finely ground muciloid coating of plantago seeds that is applied as a dry powder or in a wet slurry to the surface of the soil. It dries to form a firm but rewettable membrane that binds soil particles together but permits germination and growth of seed. Psyllium requires 12 to 18 hours drying time. Application rates shall be applied at a rate of 80 to 200 lb/acre, with enough water in solution to allow for a uniform slurry flow.

*Starch:* Starch is non-ionic, cold-water soluble (pre-gelatinized) granular cornstarch. The material is mixed with water and applied at the rate of 150 lb/acre. Approximate drying time is 9 to 12 hours.

### ***Plant-Material Based (Long Lived)***

*Pitch and Rosin Emulsion:* Generally, a non-ionic pitch and rosin emulsion has a minimum solids content of 48%. The rosin shall be a minimum of 26% of the total solids content. The soil stabilizer shall be non-corrosive, water-dilutable emulsion that upon application cures to a water insoluble binding and cementing agent. For soil erosion control applications, the emulsion is diluted and shall be applied as follows:



For clayey soil: 5 parts water to 1 part emulsion

For sandy soil: 10 parts water to 1 part emulsion

Application can be by water truck or hydraulic seeder with the emulsion/product mixture applied at the rate specified by the manufacturer.

### ***Polymeric Emulsion Blends***

*Acrylic Copolymers and Polymers:* Polymeric soil stabilizers shall consist of a liquid or solid polymer or copolymer with an acrylic base that contains a minimum of 55 percent solids. The polymeric compound shall be handled and mixed in a manner that will not cause foaming or shall contain an anti-foaming agent. The polymeric emulsion shall not exceed its shelf life or expiration date; manufacturers shall provide the expiration date. Polymeric soil stabilizer shall be readily miscible in water, non-injurious to seed or animal life, non-flammable, shall provide surface soil stabilization for various soil types without totally inhibiting water infiltration, and shall not re-emulsify when cured. The applied compound shall air cure within a maximum of 36 to 48 hours. Liquid copolymer shall be diluted at a rate of 10 parts water to 1 part polymer and applied to soil at a rate of 1,175 gal/acre.

*Liquid Polymers of Methacrylates and Acrylates:* This material consists of a tackifier/sealer that is a liquid polymer of methacrylates and acrylates. It is an aqueous 100% acrylic emulsion blend of 40% solids by volume that is free from styrene, acetate, vinyl, ethoxylated surfactants or silicates. For soil stabilization applications, it is diluted with water and applied with a hydraulic seeder at the rate of 20 gal/acre. Drying time is 12 to 18 hours after application.

*Copolymers of Sodium Acrylates and Acrylamides:* These materials are non-toxic, dry powders that are copolymers of sodium acrylate and acrylamide. They are mixed with water and applied to the soil surface for erosion control at rates that are determined by slope gradient:

Slope Gradient	lb/acre
Flat to 5:1	3.0 – 5.0
5:1 to 3:1	5.0 – 10.0
2:1 to 1:1	10.0 – 20.0

Adapted from Caltrans Construction Site BMPs

*Poly-Acrylamide and Copolymer of Acrylamide:* Linear copolymer polyacrylamide is packaged as a dry-flowable solid. When used as a stand-alone stabilizer, it is diluted at a rate of 10 lb/1,000 gal of water and applied at the rate of 5.0 lb/acre.

*Hydro-Colloid Polymers:* Hydro-Colloid Polymers are various combinations of dry-flowable poly-acrylamides, copolymers and hydro-colloid polymers that are mixed with water and applied to the soil surface at rates of 50 to 60 lb/acre. Drying times are 0 to 4 hours.

## **Cementitious-Based Stabilizers**

*Gypsum:* This is a formulated gypsum-based product that readily mixes with water and mulch to form a thin protective crust on the soil surface. It is composed of high purity gypsum that is ground, calcined and processed into calcium sulfate hemihydrate with a minimum purity of 86%. It is mixed in a hydraulic seeder and applied at rates 4,000 to 12,000 lb/acre. Drying time is 4 to 8 hours.

## **Applying Soil Stabilizers**

After selecting an appropriate soil stabilizer, the untreated soil surface must be prepared before applying the soil stabilizer. The untreated soil surface must contain sufficient moisture to assist the agent in achieving uniform distribution. In general, the following steps shall be followed:

- Follow manufacturer's recommendations for application rates, pre-wetting of application area, and cleaning of equipment after use.
- Prior to application, roughen embankment and fill areas. Track walking shall only be used where rolling is impractical.
- Consider the drying time for the selected soil stabilizer and apply with sufficient time before anticipated rainfall. Soil stabilizers shall not be applied during or immediately before rainfall.
- Avoid over-spray onto the traveled way, sidewalks, lined drainage channels, sound walls, and existing vegetation.
- Soil stabilizers shall not be applied to frozen soil, areas with standing water, under freezing or rainy conditions, or when the air temperature is below 40°F during the curing period.
- More than one treatment is often necessary, although the second treatment may be diluted or have a lower application rate.
- Generally, soil stabilizers require a minimum curing time of 24 hours before they are fully effective. Refer to manufacturer's instructions for specific cure times.



- For liquid agents:
  - Crown or slope ground to avoid ponding.
  - Uniformly pre-wet ground at 0.03 to 0.3 gal/yd<sup>2</sup> or according to manufacturer's recommendations.
  - Apply solution under pressure. Overlap solution 6 to 12 in.
  - Allow treated area to cure for the time recommended by the manufacturer; typically, at least 24 hours.
  - In low humidities, reactivate chemicals by re-wetting with water at 0.1 to 0.2 gal/yd<sup>2</sup>.

**Maintenance and Inspection**

- Reapplying the selected soil stabilizer may be needed for proper maintenance. High traffic areas shall be inspected on a daily basis, and lower traffic areas shall be inspected on a weekly basis.
- After any rainfall event, the Contractor is responsible for maintaining all slopes to prevent erosion.
- Maintain any unbroken, temporary mulched ground cover while DSAs are non-active. Repair any damaged ground over and re-mulch exposed areas.

**Table 1**  
**Properties of Soil Stabilizers for Erosion Control**

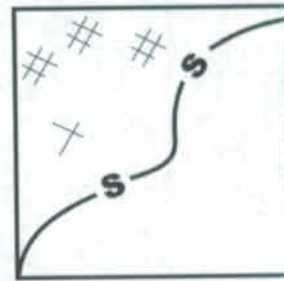
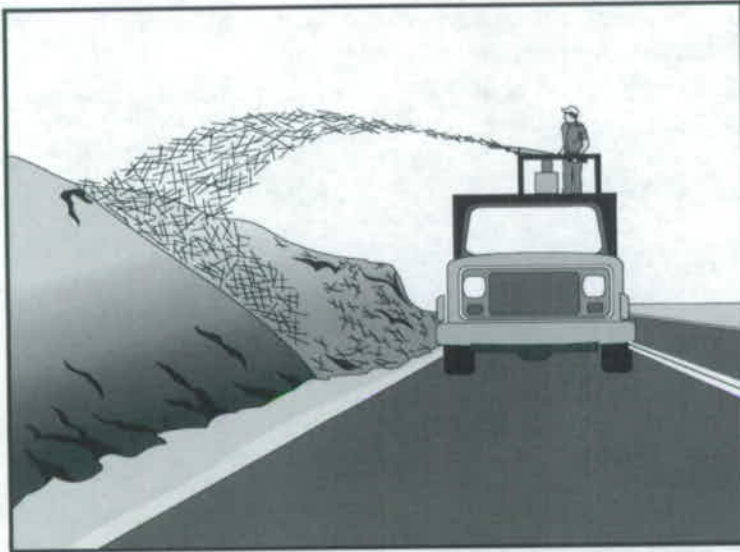
Chemicals	Plant Material Based (Short Lived)	Plant Material Based (Long Lived)	Polymeric Emulsion Blends	Cementitious-Based Stabilizers
Relative Cost	Low	Low	Low	Low
Resistance to Leaching	High	High	Low to Moderate	Moderate
Resistance to Abrasion	Moderate	Low	Moderate to High	Moderate to High
Longevity	Short to Medium	Medium	Medium to Long	Medium
Minimum Curing Time before Rain	9 to 18 hours	19 to 24 hours	0 to 24 hours	4 to 8 hours
Compatibility with Existing Vegetation	Good	Poor	Poor	Poor
Mode of Degradation	Biodegradable	Biodegradable	Photodegradable/ Chemically Degradable	Photodegradable/ Chemically Degradable
Labor Intensive	No	No	No	No
Specialized Application Equipment	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher
Liquid/Powder	Powder	Liquid	Liquid/Powder	Powder
Surface Crusting	Yes, but dissolves on rewetting	Yes	Yes, but dissolves on rewetting	Yes
Clean-Up	Water	Water	Water	Water
Erosion Control Application Rate	Varies	Varies	Varies	480 to 1,450 gal/ac



# Straw Mulch

**SS-6**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

**Definition and Purpose** Straw mulch consists of placing a uniform layer of straw and incorporating it into the soil with a studded roller or anchoring it with a tackifier stabilizing emulsion.

- Appropriate Applications**
- Straw mulch is typically used for soil stabilization as a temporary surface cover on disturbed areas until soils can be prepared for re-vegetation and permanent vegetation is established.
  - Also typically used in combination with temporary and/or permanent seeding strategies to enhance plant establishment.
- Limitations**
- Availability of erosion control contractors and straw may be limited prior to the rainy season due to high demand.
  - There is a potential for introduction of weed-seed and unwanted plant material.
  - When straw blowers are used to apply straw mulch, the treatment areas must be within 150 ft. of a road or surface capable of supporting trucks.
  - Straw mulch applied by hand is more time intensive and potentially costly.
  - May have to be removed prior to permanent seeding or soil stabilization.
  - Application of straw mulch should be performed in calm conditions with wind speeds below 8 mph.

**Standards and Specifications**

- When working in sandy soils, pushing the straw into the soils with shovels, discs, or other equipment has limited effectiveness. Other methods, such as the use of tackifiers, should be considered to secure the mulch in place.
- Straw shall be derived from wheat, rice, or barley.
- All materials shall conform to Standard Specifications Section 726.
- A tackifier is the preferred method for anchoring straw mulch to the soil on slopes.
- Crimping, punch roller-type rollers, or track-walking may also be used to incorporate straw mulch into the soil on slopes. Track walking shall only be used where other methods are impractical.
- Avoid placing straw onto the traveled way, sidewalks, lined drainage channels, sound walls, and existing vegetation.
- Straw mulch with tackifier shall not be applied during or immediately before rainfall.

**Application Procedures**

- Generally, apply loose straw at a minimum rate of 4,000 lb/acre, or as indicated in the project's special provisions, manufacturer's recommendation, either by machine or by hand distribution. Application procedure should follow Standard Specifications Section 211. If stabilizing emulsion will be used to anchor the straw mulch in lieu of incorporation, roughen embankment or fill areas by rolling with a crimping or punching type roller or by track walking, before placing the straw mulch. Track walking should only be used where rolling is impractical and shall be considered when applying duff.
- The straw mulch must be evenly distributed on the soil surface.
- Anchor the mulch in place by using a tackifier or by "punching" it into the soil mechanically (incorporating).
- A tackifier acts to glue the straw fibers together and to the soil surface. The tackifier shall be selected based on longevity and ability to hold the fibers in place.
- A tackifier is typically applied at a rate of 125 lb/acre. In windy conditions, the rates are typically 180 lb/acre.
- Methods for holding the straw mulch in place depend upon the slope steepness, accessibility, soil conditions and longevity. If the selected method is incorporation of straw mulch into the soil, then do as follows:



- Applying and incorporating straw shall follow the requirements in Standard Specifications Sections 726 and 211.
- On small areas, a spade or shovel can be used.
- On slopes with soils that are stable enough and of sufficient gradient to safely support construction equipment without contributing to compaction and instability problems, straw can be "punched" into the ground using a knife-blade roller or a straight bladed coulter, known commercially as a "crimper".
- On small areas and/or steep slopes, straw can also be held in place using plastic netting or jute. The netting shall be held in place using 11 gauge wire staples, geotextile pins or wooden stakes (as described in BMP SS-7, "Geotextiles, Plastic Covers and Erosion Control Blankets/Mats").

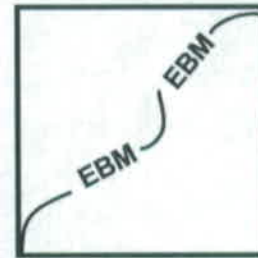
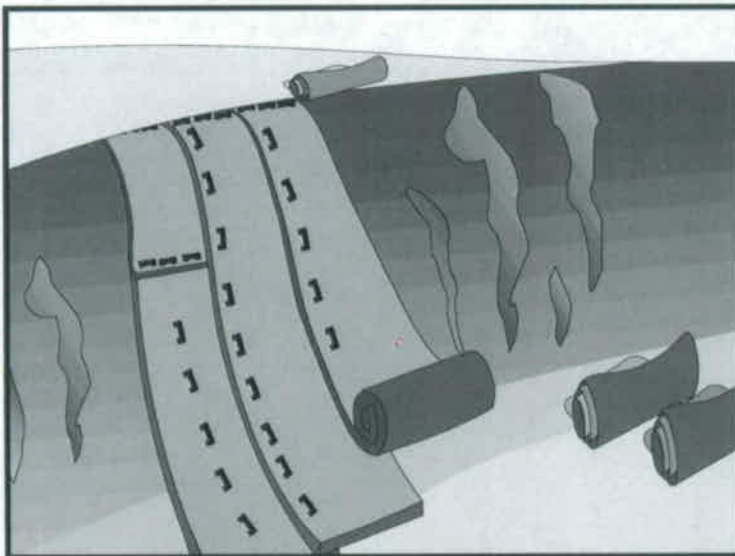
## Maintenance and Inspections

- The key consideration in Maintenance and Inspection is that the straw needs to last long enough to achieve erosion control objectives.
- Maintain an unbroken, temporary mulched ground cover while disturbed soil areas are non-active. Repair any damaged ground cover and re-mulch exposed areas.
- Reapplication of straw mulch and tackifier may be required to maintain effective soil stabilization over disturbed areas and slopes.
- After any rainfall event, the Contractor is responsible for maintaining all slopes to prevent erosion.

# Geotextiles, Mats, Plastic Covers and Erosion Control Blankets

**SS-7**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

### Definition and Purpose

This Best Management Practice (BMP) involves the placement of geotextiles, mats, plastic covers, or erosion control blankets to temporarily stabilize disturbed soil areas and protect soils from erosion by wind or water. Refer to the NDOT Qualified Products List (QPL) for pre-approved products.

### Appropriate Applications

These measures are used when disturbed soils may be particularly difficult to stabilize, including the following situations:

- Steep slopes, generally steeper than 3:1
- Slopes with loose soils or non-cohesive sandy and/or silty material.
- Slopes and disturbed soils where mulch must be anchored
- Disturbed areas where plants are slow to develop.
- Channels with flows exceeding 3.3 ft/s
- Channels to be vegetated
- Stockpiles
- Slopes adjacent to water bodies of environmentally sensitive areas (ESAs).

### Limitations

- Blankets and mats are more expensive than other erosion control measures, due to labor and material costs. This usually limits their application to areas inaccessible to hydraulic equipment, or where other measures are not applicable, such as channels.



## **Geotextiles, Mats, Plastic Covers and Erosion Control Blankets**

Adapted from Caltrans Construction Site BMPs

- Blankets and mats are generally not suitable for excessively rocky sites or areas where the final vegetation will be mowed (since staples and netting can catch in mowers).
- Plastic sheeting is easily vandalized, easily torn, photodegradable, and must be disposed of at a landfill in accordance with Standard Specifications section 107.
- Non-degradable fabrics must generally be removed when permanent stabilization measures are ready to be installed. Failure to move these materials creates trash that may be environmentally harmful and may result in littering fines.
- Plastic results in 100 percent runoff, which may cause serious erosion problems in the areas receiving the increased flow.
- The use of plastic should be limited to covering stockpiles, or very small graded areas for short periods of time (such as through one imminent storm event), until alternative measures, such as seeding and mulching, may be installed.
- Geotextiles, mats, plastic covers, and erosion control covers have maximum flow rate limitations; consult the manufacturer for proper selection.

### **Standards and Specifications**

#### **Material Selection**

There are many types of erosion control blankets and mats, and selection of the appropriate type shall be based on the specific type of application and site conditions. Certification of compliance shall be in accordance with Standard Specifications Sections 211 and 726, the project's Special Provisions and the following sections.

#### **Geotextiles**

A wide variety of Geotextiles are available dependant on their intended uses which range from separation of different materials (such as road bedding and underlying soils) to lining ponds and landfills. For temporary erosion control, geotextile fabrics typically consist of woven or non-woven fabrics that are used to line channels or slopes and are usually used in combination with rock or other mulches or riprap.

Geomembranes are more impervious type of geotextile and can be used to cover stockpiles or bare soil areas, where a more durable material (as compared to plastic sheeting) is desired. The use of geomembranes for this application will likely be very limited due to their higher costs.

# Geotextiles, Mats, Plastic Covers and Erosion Control Blankets

**SS-7**

Adapted from Caltrans Construction Site BMPs

- Geotextiles should be secured in place with wire staples or sandbags and by keying into tops of slopes and edges to prevent infiltration of surface waters under Geotextile. Staples shall be made of 0.12 in. steel wire and shall be U-shaped with 8 in. legs and 2 in. crown.
- Geotextiles may be reused if, in the opinion of the Engineer, they are suitable for the use intended.

## ***Plastic Covers***

- Plastic sheeting shall have a minimum thickness of 0.24 in. and shall be keyed in at the top of slope and firmly held in place with sandbags or other weights placed no more than 10 ft. apart. Seams are typically taped or weighted down their entire length, and there shall be at least a 12 to 24 in. overlap of all seams. Edges shall be embedded a minimum of 6 in. in soil.
- All sheeting shall be inspected periodically after installation and after significant rainstorms to check for erosion, undermining, and anchorage failure. Any failures shall be repaired immediately. If washout or breakages occur, the material shall be re-installed after repairing the damage to the slope.

## ***Erosion Control Blankets/Mats***

- Biodegradable rolled erosion control products (RECPs) are typically composed of jute fibers, curled wood fibers, straw, coconut fiber, or a combination of these materials. In order for an RECP to be considered 100% biodegradable, the netting, sewing or adhesive system that holds the biodegradable mulch fibers together must also be biodegradable.
  - **Jute** is a natural fiber that is made into a yarn that is loosely woven into a biodegradable mesh. It is designed to be used in conjunction with vegetation and has longevity of approximately one year. The material is supplied in rolled strips, which shall be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.
  - **Excelsior (curled wood fiber)** blanket material shall consist of machine-produced mats of curled wood excelsior with 80 percent of the fiber 6 in. or longer. The excelsior blanket shall be of consistent thickness. The wood fiber shall be evenly distributed over the entire area of the blanket. The top surface of the blanket shall be covered with a photodegradable extruded plastic mesh. The blanket shall be smolder resistant without the use of chemical



## **Geotextiles, Mats, Plastic Covers and Erosion Control Blankets**

Adapted from Caltrans Construction Site BMPs

additives and shall be non-toxic and non-injurious to plant and animal life. Excelsior blanket shall be furnished in rolled strips a minimum of 48 in. wide, and shall have an average weight of 0.1 lb/ft<sup>2</sup>,  $\pm 10$  percent, at the time of manufacture. Excelsior blankets shall be secured in place with wire staples. Staples shall be made of 0.12 in. steel wire and shall be U-shaped with 8 in. legs and 2 in. crown.

- **Straw blanket** shall be machine-produced mats of straw with a lightweight biodegradable netting top layer. The straw shall be attached to the netting with biodegradable thread or glue strips. The straw blanket shall be of consistent thickness. The straw shall be evenly distributed over the entire area of the blanket. Straw blanket shall be furnished in rolled strips a minimum of 6.5 ft. wide, a minimum of 82 ft. long, and a minimum of 0.055 lb/ft<sup>2</sup>. Straw blankets shall be secured in place with wire staples. Staples shall be made of 0.12 in. steel wire and shall be U-shaped with 8 in. legs and 2 in. crown.
- **Wood fiber blanket** is composed of biodegradable fiber mulch with extruded plastic netting held together with adhesives. The material is designed to enhance re-vegetation. The material is furnished in rolled strips, which shall be secured to the ground with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Coconut fiber blanket** shall be machine-produced mats of 100 percent coconut fiber with biodegradable netting on the top and bottom. The coconut fiber shall be attached to the netting with biodegradable thread or glue strips. The coconut fiber blanket shall be of consistent thickness. The coconut fiber shall be evenly distributed over the entire area of the blanket. Coconut fiber blanket shall be furnished in rolled strips with a minimum of 6.5 ft. wide, a minimum of 82 ft. long, and a minimum of 0.055 lb/ft<sup>2</sup>. Coconut fiber blankets shall be secured in place with wire staples. Staples shall be made of 0.12 in steel wire and shall be U-shaped with 8 in. legs and 2 in. crown.
- **Coconut fiber mesh** is a thin permeable membrane made from coconut or corn fiber that is spun into a yarn and woven into a biodegradable mat. It is designed to be used in conjunction with vegetation and typically has longevity of several years. The material is supplied in rolled strips, which shall be secured to the

# Geotextiles, Mats, Plastic Covers and Erosion Control Blankets

**SS-7**

Adapted from Caltrans Construction Site BMPs

soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.

- **Straw coconut fiber blanket** shall be machine-produced mats of 70 percent straw and 30 percent coconut fiber with a biodegradable netting top layer and a biodegradable bottom net. The straw and coconut fiber shall be attached to the netting with biodegradable thread or glue strips. The straw coconut fiber blanket shall be of consistent thickness and shall be evenly distributed over the entire area of the blanket. Straw coconut fiber blanket shall be furnished in rolled strips a minimum of 6.5 ft. wide, a minimum of 82 ft. long and a minimum of 0.055 lb/ft<sup>2</sup>. Straw coconut fiber blankets shall be secured in place with wire staples. Staples shall be made of 0.12 in. steel wire and shall be U-shaped with 8 in. legs and 2 in. crown.
- Non-biodegradable RECPs are typically composed of polyethylene, polypropylene, nylon or other synthetic fibers. In some cases, a combination of biodegradable and synthetic fibers is used to construct the RECP. Netting used to hold these fibers together is typically non-biodegradable as well.
- **Plastic netting** is a lightweight biaxially-oriented netting designed for securing loose mulches like straw or paper to soil surfaces to establish vegetation. The netting is photodegradable. The netting is supplied in rolled strips, which shall be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Plastic mesh** is an open-weave geotextile that is composed of an extruded synthetic fiber woven into a mesh with an opening size of less than 2 in. It is used with re-vegetation or may be used to secure loose fiber such as straw to the ground. The material is supplied in rolled strips, which shall be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Synthetic fiber with netting** is a mat that is composed of durable synthetic fibers treated to resist chemicals and ultraviolet light. The mat is a dense, three-dimensional mesh of synthetic (typically polyolefin) fibers stitched between two polypropylene nets. The mats are designed to be re-vegetated and provide a permanent composite system of soil, roots, and geomatrix. The material is furnished in rolled strips, which shall be secured with U-shaped



## **Geotextiles, Mats, Plastic Covers and Erosion Control Blankets**

Adapted from Caltrans Construction Site BMPs

staples or stakes in accordance with manufacturers' recommendations.

- **Bonded synthetic fibers** consist of a three-dimensional geomatrix nylon (or other synthetic) matting. Typically, it has more than ninety percent open area, which facilitates root growth. Its tough root-reinforcing system anchors vegetation and protects against hydraulic lift and shear forces created by high volume discharges. It can be installed over prepared soil, followed by seeding into the mat. Once vegetated, it becomes an invisible composite system of soil, roots, and geomatrix. The material is furnished in rolled strips that shall be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Combination synthetic and biodegradable RECPs** consist of biodegradable fibers, such as wood fiber or coconut fiber, with a heavy polypropylene net stitched to the top and a high-strength continuous-filament geomatrix or net stitched to the bottom. The material is designed to enhance re-vegetation. The material is furnished in rolled strips, which shall be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

### ***Site Preparation***

- Proper site preparation is essential to ensure complete contact of the blanket or matting with the soil.
- Grade and shape the area of installation.
- Remove all rocks, clods, vegetation or other obstructions so that the installed blankets or mats will have complete, direct contact with the soil.
- Prepare seedbed by loosening 2 in. to 3 in. of topsoil. When using a fabric or mat that is designed to be used in conjunction with seeding or re-vegetation follow the manufacturer's guidelines for proper seedbed for proper seedbed preparation, seed application, and/or planting.

### ***Seeding***

Seed the area before blanket installation for erosion control and re-vegetation. Seeding after mat installation is often specified for turf reinforcement application. When seeding prior to blanket installation, all check slots and other areas disturbed during installation must be re-seeded.

# Geotextiles, Mats, Plastic Covers and Erosion Control Blankets

**SS-7**

Adapted from Caltrans Construction Site BMPs

Where soil filling is specified, seed the matting and the entire disturbed area after installation and prior to filling the mat with soil.

## **Anchoring**

- U-shaped wire staples, metal geotextile stake pins or triangular wooden stakes can be used to anchor mats and blankets to the ground surface.
- Staples shall be made of 0.12 in. steel wire and shall be U-shaped with 8 in. legs and 2 in. crown. Wire staples shall be minimum of 11 gauge.
- Metal stake pins shall be 0.188 in. diameter steel with a 1.5 in. steel washer at the head of the pin.
- Wire staples and metal stakes shall be driven flush to the soil surface.
- All anchors shall be a minimum of 6 in. long and have sufficient penetration to resist pullout. Longer anchors may be required for loose soils as determined by the responsible party, NDEP Inspector, or by Manufacturer's installation guidelines.

## **Installation on Slopes**

Installation shall be in accordance with the manufacturer's recommendations. In general, these will be as follows:

- Begin at the top of the slope and anchor the blanket in a 6 in. deep by 6 in. wide trench. Backfill trench and tamp earth firmly.
- Unroll blanket down slope in the direction of water flow.
- Overlap the edges of adjacent parallel rolls 6 in. and staple every 3 ft.
- When blankets must be spliced, place blankets end over end (shingle style) with 6 in. overlap. Staple through overlapped area, approximately 12 in. apart.
- Lay blankets loosely and maintain direct contact with the soil. Do not stretch.
- Staple blankets sufficiently to anchor blanket and maintain contact with the soil. Staples shall be placed down the center and staggered with the staples placed along the edges. Steep slopes, 1:1 to 2:1, require a minimum of 2 staples/yd<sup>2</sup>. Moderate slopes, 2:1 to 3:1, require a minimum of 1½ staples/yd<sup>2</sup>, placing 1 staple/yd on centers. Gentle slopes require a minimum of 1 staple/yd<sup>2</sup>.



# **Geotextiles, Mats, Plastic Covers and Erosion Control Blankets**

Adapted from Caltrans Construction Site BMPs

## ***Installation in Channels***

Installation shall be in accordance with the manufacturer's recommendations. In general, these will be as follows:

- Dig initial anchor trench 12 in. deep and 6 in. wide across the channel at the lower end of the project area.
- Excavate intermittent check slots, 6 in. deep and 6 in. wide across the channel at 25 to 30 ft. intervals along the channels.
- Cut longitudinal channel anchor slots 4 in. deep and 4 in. wide along each side of the installation to bury edges of matting, whenever possible extend matting 2 in. to 3 in. above the crest of the channel side slopes.
- Beginning at the downstream end and in the center of the channel, place the initial end of the first roll in the anchor trench and secure with fastening devices at 12 in. intervals. Note: matting will initially be upside down in anchor trench.
- In the same manner, position adjacent rolls in anchor trench, overlapping the preceding roll a minimum of 3 in.
- Secure these initial ends of mats with anchors at 12 in. intervals, backfill and compact soil.
- Unroll center strip of matting upstream. Stop at next check slot or terminal anchor trench. Unroll adjacent mats upstream in similar fashion, maintaining a 3 in. overlap.
- Fold and secure all rolls of matting snugly into all transverse check slots. Lay mat in the bottom of the slot then fold back against itself. Anchor through both layers of mat at 12 in. intervals, then backfill and compact soil. Continue rolling all mat widths upstream to the next check slot or terminal anchor trench.
- Alternate method for non-critical installations: Place two rows of anchors on 6 in. centers at 25 ft. to 30 ft. intervals in lieu of excavated check slots.
- Shingle lap ends by overlapping uphill on top of downhill fabric a minimum of 12 in. to prevent water from flowing underneath fabric at splice locations. See schematics at end of this fact sheet.
- Place edges of outside mats in previously excavated longitudinal slots, anchor using prescribed staple pattern, backfill and compact soil.

# Geotextiles, Mats, Plastic Covers and Erosion Control Blankets

**SS-7**

Adapted from Caltrans Construction Site BMPs

- Anchor, fill and compact upstream end of mat in a 6 in. by 12 in. terminal trench.
- Secure mat to ground surface using U-shaped wire staples, geotextile pins, or wooden stakes.
- Seed and fill turf reinforcement matting with soil, if specified.

## ***Soil Filling (if specified for turf reinforcement)***

- Always consult the manufacturer's recommendations for installation.
- Do not drive tracked or heavy equipment over mat.
- Avoid any traffic over matting if loose or wet soil conditions exist.
- Use shovels, rakes or brooms for fine grading and touch up.
- Smooth out soil filling; just exposing top netting of mat.

## ***Blanket Removal***

- When no longer required for work, non-degradable temporary blankets shall be removed from the site and disposed of in conformance with NDOT Standard Specifications Section 107.

## **Maintenance and Inspection**

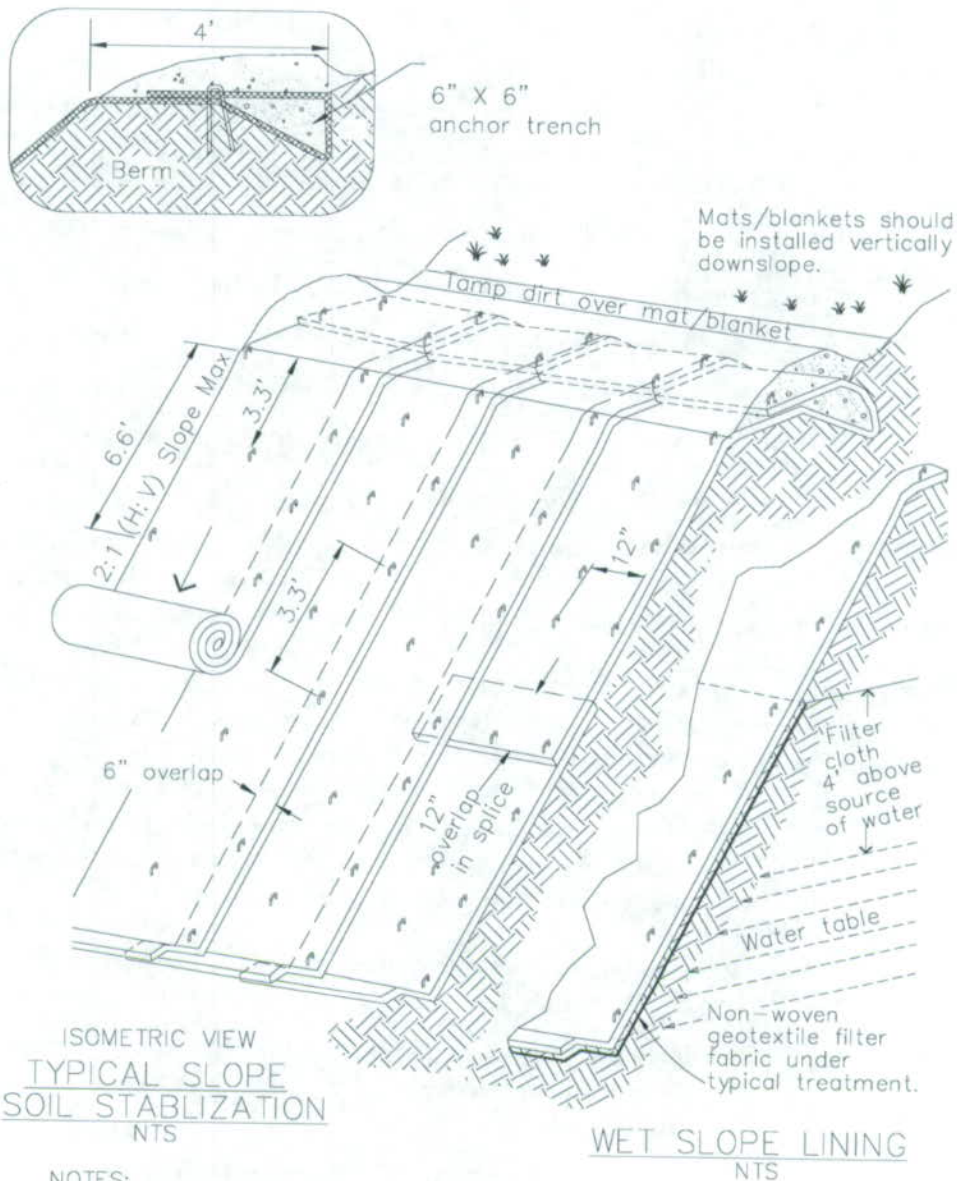
Areas treated with temporary soil stabilization shall be inspected as specified in the special provisions. Areas treated with temporary geotextiles, mats, blankets and other covers shall be maintained to provide adequate erosion control. Temporary geotextiles, mats, blankets and other covers shall be reapplied or replaced on exposed soils when greater than 10% of the previously treated area becomes exposed or exhibits visible erosion or as determined by the responsible party.

- All blankets and mats shall be inspected periodically after installation.
- Installation shall be inspected after significant rainstorms to check for erosion and undermining. Any failures shall be repaired immediately.
- If washout or breakage occurs, re-install the material after repairing the damage to the slope or channel.



# Geotextiles, Mats, Plastic Covers and Erosion Control Blankets

Adapted from Caltrans Construction Site BMPs



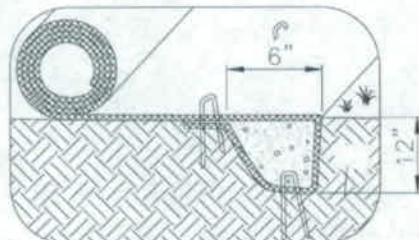
## NOTES:

1. Slope surface shall be free of rocks, clods, sticks and grass. Mats/blankets shall have good soil contact.
2. Lay blankets loosely and stake or staple to maintain direct contact with the soil. Do not stretch.
3. Install per manufacturer's recommendations

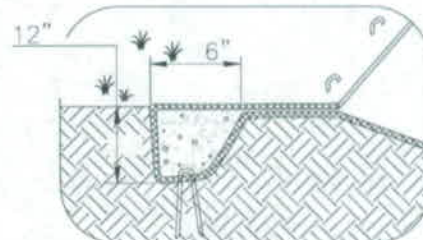
# Geotextiles, Mats, Plastic Covers and Erosion Control Blankets

**SS-7**

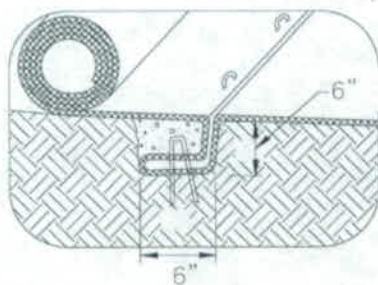
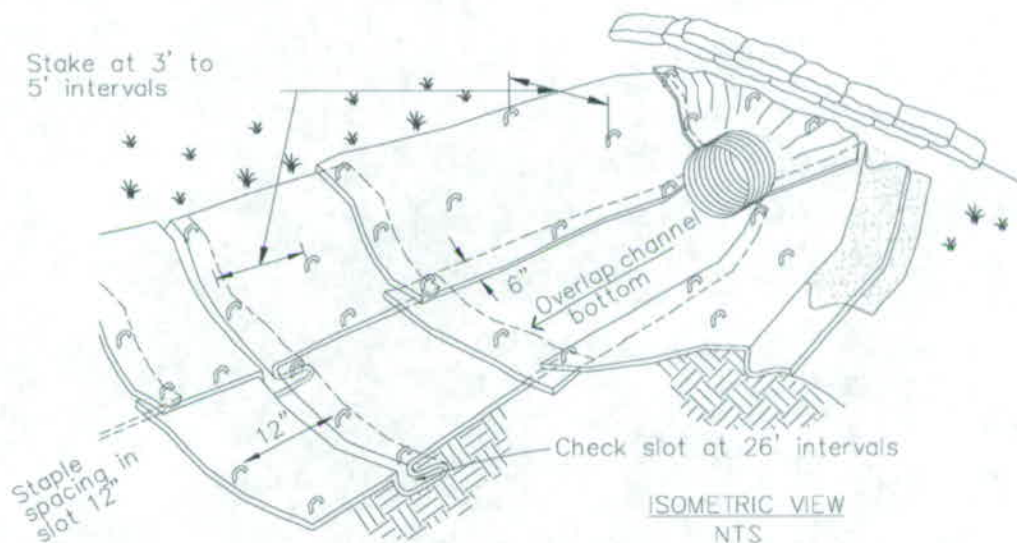
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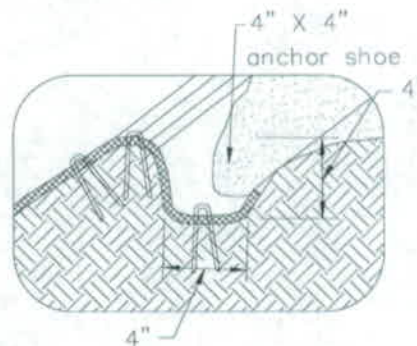
INITIAL CHANNEL ANCHOR TRENCH XS  
NTS



TERMINAL SLOPE AND CHANNEL  
ANCHOR TRENCH XS  
NTS



INTERMITTENT CHECK SLOT XS  
NTS



LONGITUDINAL ANCHOR TRENCH XS  
NTS

## NOTES:

1. Check slots to be constructed per manufacturers specifications.
2. Staking or stapling layout per manufacturers specifications.
3. Install per manufacturer's recommendations



# Wood Mulching

**SS-8**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

**Definition and Purpose** Wood mulching consists of applying a mixture of chipped or cut wood mulch per Standard Specification Section 726, bark or compost. Wood mulch is mostly applicable to landscape projects.

The primary function of wood mulching is to reduce erosion by protecting bare soil from rainfall impact, increasing infiltration, and reducing runoff.

**Appropriate Applications** Wood mulching is considered a temporary soil stabilization (erosion control) alternative in the following situations:

- As a stand-alone temporary surface cover on disturbed areas until soils can be prepared for revegetation and permanent vegetative cover can be established.
- As short term, non-vegetative ground cover on slopes to reduce rainfall impact, decrease the velocity of sheet flow, settle out sediment and reduce wind erosion.

- Limitations**
- Wood mulch may introduce unwanted species.
  - Chipped or cut wood per Standard Specification Section 726 does not withstand concentrated flows and is prone to sheet erosion.
  - Green material has the potential for the presence of unwanted weeds and other plant materials. Delivery system is primarily by manual labor, although pneumatic application equipment is available.
  - Wood mulch should not be applied in winds that cause unwanted or excessive spreading of the mulch.

**Standards and Specifications****Mulch Selection**

There are many types of mulches, and selection of the appropriate type shall be based on the type of application and site conditions. Prior to use of wood mulches, there shall be concurrence with the NDOT headquarters Landscape Architect since some mulch use on construction projects may not be compatible with planned or future projects. Selection of wood mulches by the Contractor shall comply with Standard Specifications Sections 726 and 211.

**Application Procedures**

Prior to application, after existing vegetation has been removed, roughen embankment and fill areas by rolling with a punching type roller or by track walking. The construction-application procedures for mulches vary significantly depending upon the type of mulching method specified. Two (2) methods are highlighted here:

- **Green Material:** This type of mulch is produced by recycling of vegetation trimmings such as chipped or cut shrubs and trees. Methods of application are generally by hand, although pneumatic methods are available. Materials composted must be indigenous-no compost of noxious weeds. Green material must conform to Standard Specification Section 726.
  - It can be used as a temporary ground cover with or without seeding.
  - The green material shall be evenly distributed on site to a depth of not more than 2 in.
- **Chipped or cut Wood per Standard Specification Section 726:** Suitable for ground cover in ornamental or revegetated plantings.
  - Chipped or cut wood/bark per Standard Specification Section 726 is conditionally suitable; see note under limitations.
  - Shall be distributed by hand (although pneumatic methods may be available).
  - The mulch shall be evenly distributed across the soil surface to a depth of 3 in.
- Avoid mulch placement onto the traveled way, sidewalks, lined drainage channels, sound walls, and existing vegetation.
- All material must be removed prior to re-starting work on the slopes. In some cases, wood mulch may be incorporated into the soil if approved



Adapted from Caltrans Construction Site BMPs

by the Engineer.

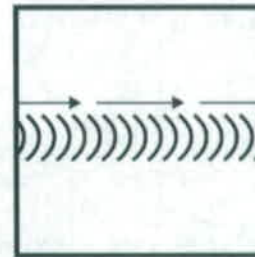
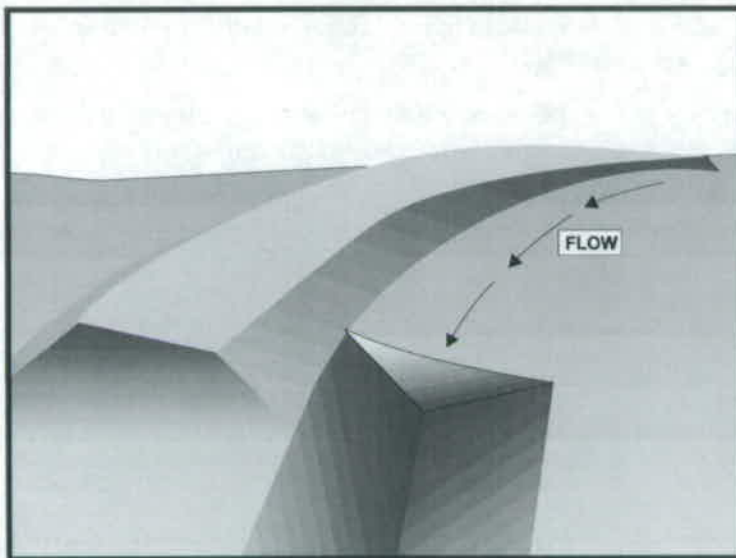
## Maintenance and Inspection

- Mulch material should come from indigenous plants only.
- Regardless of the mulching technique selected, the key consideration in Maintenance and Inspection is that the mulch needs to last long enough to achieve erosion-control objectives. If the mulch is applied as a stand-alone erosion control method over disturbed areas (without seed), it shall last the length of time the site will remain barren or until final re-grading and re-vegetation.
- Where vegetation is not the ultimate cover, such as ornamental and landscape applications of bark or wood chips, inspection and maintenance shall focus on longevity and integrity of the mulch.

# Earth Dikes/Drainage Swales and Lined Ditches

**SS-9**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

**Definition and Purpose** These are structures that intercept, divert and convey surface run-on, generally sheet flow, to prevent erosion.

**Appropriate Applications** Earth dikes/drainage swales and lined ditches may be used to:

- Convey surface runoff down sloping land.
- Intercept and divert runoff to avoid sheet flow over sloped surfaces.
- Divert and direct runoff towards a stabilized watercourse, drainage pipe or channel.
- To intercept runoff from paved surfaces.

Earth dikes/drainage swales and lined ditches also may be used:

- Below any grade where runoff begins to concentrate
- Along roadways and facility improvements subject to flood drainage
- At the top of slopes to divert run-on from adjacent or undisturbed slopes
- At bottom and mid-slope locations to intercept sheet flow and convey concentrated flows

This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary.



# Earth Dikes/Drainage Swales and Lined Ditches

Adapted from Caltrans Construction Site BMPs

- Limitations**
- Earth dikes/drainage swales and lined ditches are not suitable as sediment trapping devices.
  - May be necessary to use other soil stabilization and sediment controls, such as check dams, plastics, and blankets, to prevent scour and erosion in newly graded dikes, swales and ditches.

**Standards and Specifications** Care must be applied to correctly size and locate earth dikes, drainage swales and lined ditches. The risks to public safety and property damage and environmental consequences, due to erosion of the measure, soil types, over topping, flow backups, washout, and drainage flow patterns, should be carefully considered when designing these facilities. Unless local drainage design ordinances or criteria state otherwise and are more stringent, the following general design guidelines should be considered:

- One temporary drain or swale should serve no more than 5 acres,
- In the Lake Tahoe Basin, temporary conveyances shall not be overlapped by the 20 yr., 1 hr. event, for the remainder of Nevada facilities should be designed for the 2 yr., 24 hour event unless local criteria are more stringent.
- Avoid constructing drains or swales in cut or fill slopes whenever possible.
- Compact all dikes, berms and fills per Standard Specification Section 207 for culvert foundation backfill,
- Conveyances with slopes less than 5% shall be stabilized by seeding or by mulching and/or geotextile fabric if re-vegetation is not possible. Slopes greater than 5% should be lined with erosion control mats, blankets, and/or geogrids, webs or meshes with rock mulch or rip-rap as deemed appropriate by the designer,
- Side slopes should be 2:1 or flatter,
- Drainage gradients should be at least 1% but not greater than 15%,
- Construct swales and dikes downstream to upstream
- Provide stabilized outlets.

- Maintenance and Inspections**
- Inspect temporary measures prior to the rainy season, after rainfall events, and regularly (approximately once per week) during the rainy season. See Section 2 of this manual for rainy season description.
  - Inspect ditches and berms for washouts. Replace lost riprap, damaged linings or soil stabilizers as needed.

# Earth Dikes/Drainage Swales and Lined Ditches

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**SS-9**

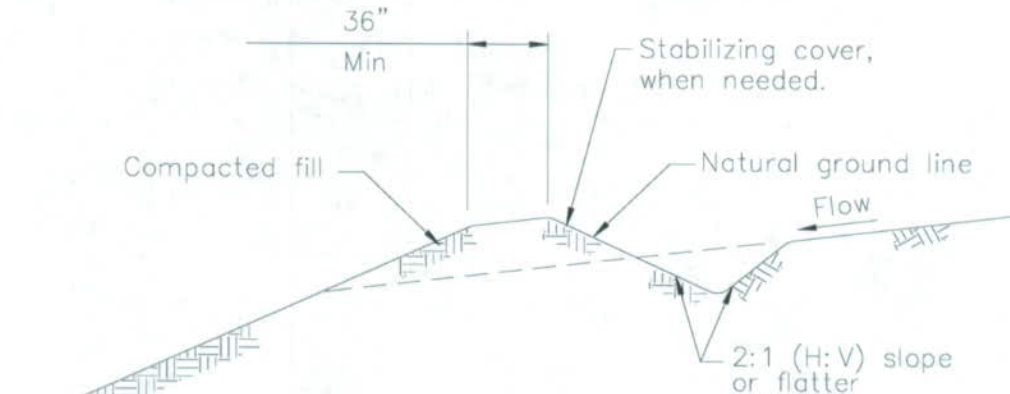
Adapted from Caltrans Construction Site BMPs

- Inspect channel linings, embankments, and beds of ditches and berms for erosion and accumulation of debris and sediment. Remove debris and sediment, and repair linings and embankments as needed.
- Temporary conveyances shall be completely removed as soon as the surrounding drainage area has been stabilized, or at the completion of construction.



## Earth Dikes/Drainage Swales and Lined Ditches

Adapted from Caltrans Construction Site BMPs

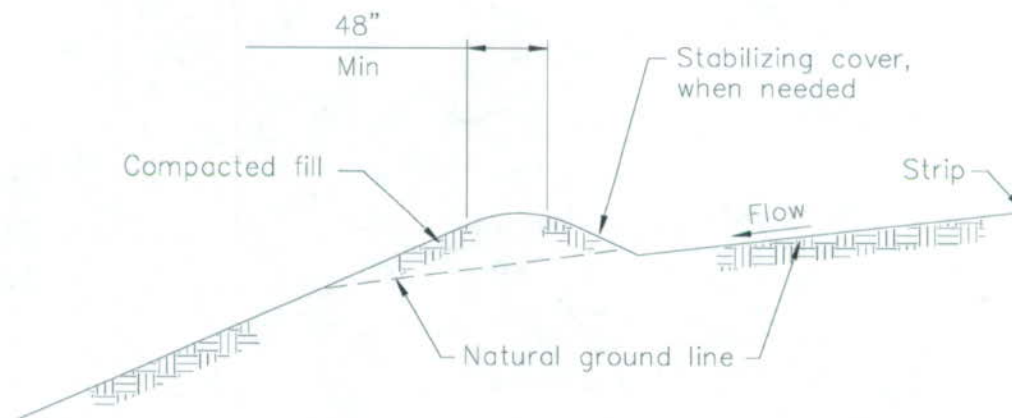


TYPICAL DRAINAGE SWALE

NOT TO SCALE

NOTES:

1. Stabilize inlet, outlets and slopes.
2. Properly compact the subgrade.



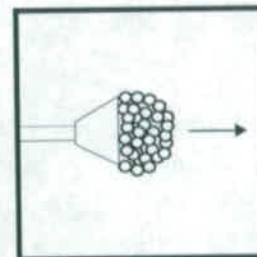
TYPICAL EARTH DIKE

NOT TO SCALE

# Outlet Protection/Velocity Dissipation Devices

**SS-10**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

## Definition and Purpose

Outlet protection/velocity dissipation devices are placed at pipe outlets to prevent scour and reduce the velocity and/or energy of exiting storm water flows. This fact sheet provides guidance for their use as a temporary BMP, which must be removed at the end of construction. Permanent outlet protection will be specified in the construction plans. Additional guidance on the sizing and the use of outlet protection may be found in the NDOT Drainage Manual or in FHWA's Hydraulic Engineer Circular (HEC) 14, Hydraulic Design of Energy Dissipaters for Culverts and Channels, Sept. 1983 FHWA #EPD-86-110.

## Appropriate Applications

- These devices may be used at the following locations:
  - Outlets of pipes, drains, culverts, slope drains, diversion ditches, swales, conveyances or channels.
  - Outlets located at the bottom of mild to steep slopes.
  - Discharge outlets that carry continuous flows of water.
  - Outlets subject to short, intense flows of water, such as flash floods.
  - Points where lined conveyances discharge to unlined conveyances.
- This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary.



## Outlet Protection/Velocity Dissipation Devices

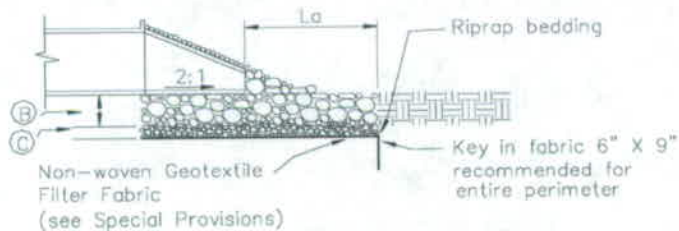
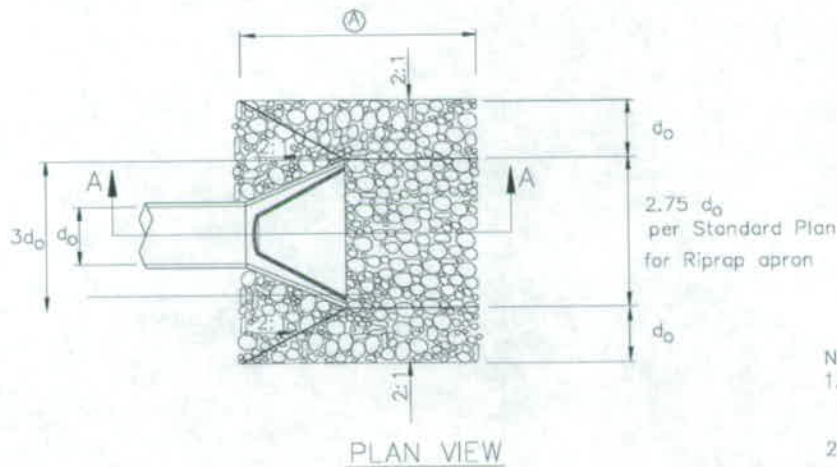
Adapted from Caltrans Construction Site BMPs

- Limitations
  - Loose rock may have stones washed away during high flows unless it is designed properly.
- Standards and Specifications
  - There are many types of energy dissipater's, with rock being the one that is represented in the attached figure.
  - Install riprap at selected outlet. Riprap aprons are best suited for temporary use during construction.
  - Carefully place riprap to avoid damaging the filter fabric in accordance with Standard Specifications Section 610.
  - For proper operation of apron:
    - Align apron with receiving stream and keep straight throughout its length. If a curve is needed to fit site conditions, place it in upper section of apron.
    - Protect the underlying erosion control fabric with the corresponding class of riprap bedding per Standard Specification Section 706.
  - Outlets on slopes steeper than 10 percent shall have additional protection.
- Maintenance and Inspection
  - Inspect temporary measures prior to the rainy season, after rainfall events, and regularly (approximately once per week) during the rainy season.
  - Inspect apron for displacement of the riprap and/or damage to the underlying fabric. Repair fabric and replace riprap that has washed away.
  - Inspect for scour beneath the riprap and around the outlet. Repair damage to slopes or underlying erosion control fabric per Standard Specification Section 726.
  - Temporary devices shall be completely removed as soon as the surrounding drainage area has been stabilized, or at the completion of construction.

# Outlet Protection/Velocity Dissipation Devices

**SS-10**

Adapted from Caltrans Construction Site BMPs



## NOTES:

1. HYDRAULIC SECTION'S APPROVAL MUST BE OBTAINED PRIOR TO INCORPORATION INTO PLANS.
2. WHEN NO END SECTION IS USED, ADDITIONAL RIPRAP SHALL BE AS REQUIRED BY THE HYDRAULIC ENGINEER.
3. FOR MULTIPLE PIPE INSTALLATIONS, (C) DIMENSION SHALL BE ADJUSTED ACCORDING TO PIPE SEPARATION. SEE NDOT STANDARD PLANS. (DRAWING R-2.1.1)
4. PIPE OUTLET TO WELL DEFINED CHANNEL

Culvert Size	(A)
in.	
18 to 36	3d <sub>o</sub>
42 to 84	4d <sub>o</sub>

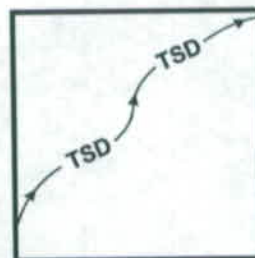
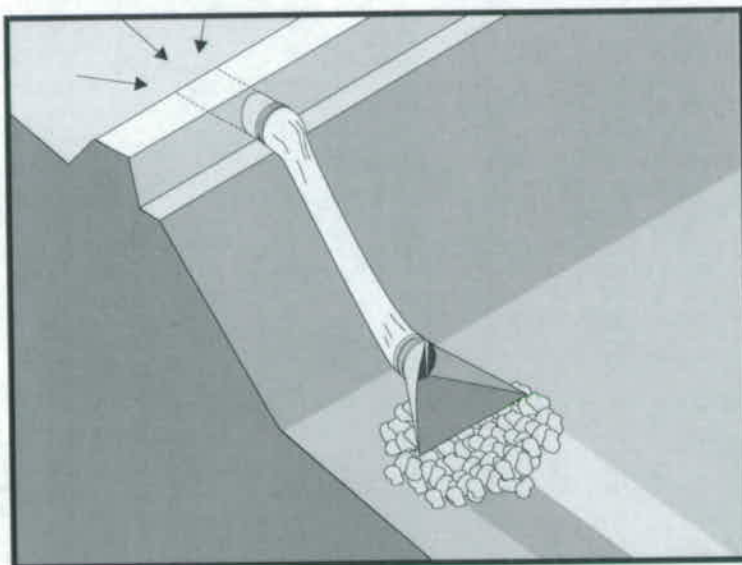
Riprap and Bedding Class	(B)	(C)
	in.	in.
150	12	8
300	24	8
400	36	10
550	48	12
700	60	12
900	72	24



# Slope Drains

**SS-11**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

**Definition and Purpose** A slope drain is a pipe used to intercept and direct surface runoff or groundwater into a stabilized watercourse, trapping device or stabilized area. Slope drains are used with lined ditches to intercept and direct surface flow away from slope areas to protect cut or fill slopes. Functions as both a temporary and permanent BMP. Functions as both a temporary and permanent BMP.

## Appropriate Applications

- Slope drains may be used at construction sites where slopes may be eroded by surface runoff.
- This BMP may be implemented on a project-by-project basis with other BMPs.
- Slope drains must be designed by a hydraulic engineer.

## Limitations

- Severe erosion may result when slope drains fail by over topping, piping, or pipe separation.

## Standards and Specifications

- When using slope drains, limit drainage area to 10 acres per pipe. For larger areas, use a rock-lined channel or a series of pipes.
- Maximum slope generally limited to 2:1, as energy dissipation below steeper slopes is difficult.
- Direct surface runoff to slope drains with interceptor dikes. See BMP SS-8, "Earth Dikes/Drainage Swales, and Lined Ditches".
- Slope drains can be placed on or buried underneath the slope surface.
- Allowable materials are Corrugated Steel, Aluminum or Polyethylene per Standard Specifications Section 608.

- When installing slope drains:
  - Install slope drains perpendicular to slope contours.
  - Compact soil around and under entrance, outlet, and along length of pipe.
  - Securely anchor and stabilize pipe and appurtenances into soil.
  - Check to ensure that pipe connections are watertight.
  - Protect area around inlet with filter cloth. Protect outlet with riprap. The Contractor or his/her engineer must insure that high velocities/energy is not created at the outlet of the drain.
  - Protect inlet and outlet of slope drains: use standard flared end section at entrance for pipe slope drains 12 in. and larger.
  - Slope drains should not exceed 18" diameter. Use parallel pipes if necessary to convey design flows.
  - In Lake Tahoe, size slope drains to convey the 20 year, 1 hr. storm. In the remainder of Nevada the 2 yr., 24 hr. event shall be used to size temporary slope drains.

**Maintenance and Inspection**

- Inspect when rain is forecasted and after each rainstorm, and twice monthly until the tributary drainage area has been stabilized. Follow routine inspection procedures for inlets thereafter.
- Inspect outlet for erosion and downstream scour. If eroded, repair damage and install additional energy dissipation measures. If downstream scour is occurring, it may be necessary to reduce flows being discharged into the channel unless other preventative measures are implemented.
- Inspect slope drainage for accumulations of debris and sediment.
- Remove built-up sediment from entrances and outlets as required. Flush drains if necessary; capture and settle out sediment from discharge.
- Make sure water is not ponding onto inappropriate areas (e.g., active traffic lanes, material storage areas, etc.).



## SS-11

Earthen dike (compacted)

Waterproof seal at pipe joints per manufacturer's guidance

Flared end section

Securely anchored to slope per NDOT Standard Plans Embankment Protection Anchorage

$D + 12"$

$D$

$D = 18"$  Max per NDOT Standard Detail for Embankment Protector

4 ft. Min

See Outlet Protection/Velocity Dissipation Devices (SS-10)

TYPICAL SLOPE DRAIN  
NOT TO SCALE

# Streambank Stabilization

SS-12

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

### Definition and Purpose

Drainage systems including the stream channel, streambank, and associated riparian areas, are dynamic and sensitive ecosystems that respond to changes in land use activity. Streambank and channel disturbance resulting from construction activities can increase the stream's sediment load, which can cause channel erosion or sedimentation and have adverse affects on the biotic system. Best Management Practices can reduce the discharge of sediment and other pollutants and minimize the impact of construction activities on watercourses. Streams listed as 303(d) by the Nevada Department of Environmental Protection (NDEP) may require numerous measures to prevent any increases in sediment load to the stream.

### Appropriate Applications

These procedures typically apply to all construction projects that disturb or occur within stream channels and their associated riparian areas.

### Limitations

Specific permit requirements or mitigation measures such as approval by the NDEP may be included in contract documents. If numerical-based water quality standards are mentioned in any of these and other related permits, testing and sampling may be required. Streams listed as 303(d) impaired for sediment, silt, or turbidity, by the Nevada Division of Environmental Protection will require stringent controls to prevent further water quality degradation.

### Standards and Specifications

#### Planning

- Proper planning, design, and construction techniques can minimize impacts normally associated with in-stream construction activities. Poor planning can adversely affect soil, fish, and wildlife resources, land uses, or land users. Planning should take into account: scheduling, avoidance of in-stream construction; minimizing



disturbance area and construction time period; using pre-disturbed areas; selecting crossing location; and, selecting equipment.

#### ***Scheduling (SS-1)***

- Construction activities should be scheduled according to the relative sensitivity of the environmental concerns and in accordance with SS-1 "Scheduling." Scheduling considerations will be different when working near perennial streams vs. ephemeral streams and are as follows:

When working in or next to ephemeral streams, or next to perennial streams, work should be performed during the dry season. By their very nature, ephemeral streams are usually dry in the summer, and therefore, in-stream construction activities will not cause significant water quality problems. For perennial streams, scheduling in-stream work for low flows, establishing an isolation area, or diverting the stream will significantly decrease the amount of sediment stirred up by construction work. However, when closing out the site at the end of the project, wash any fines (see Washing Fines) that accumulated in the channel back into the bed material, to decrease pollution from the first rainstorm ("first flush") of the season. When working next to ephemeral or perennial streams, erosion and sediment controls (see silt fences, etc.) should be implemented to keep sediment out of stream channel.

#### ***Minimize Disturbance***

- Minimize disturbance through: selection of the narrowest crossing location; limiting the number of equipment trips across a stream during construction; and, minimizing the number and size of work areas (equipment staging areas and spoil storage areas). Place work areas at least 50 ft (15 m) from stream channel unless not possible. Field reconnaissance should be conducted during the planning stage to identify work areas.

#### ***Use of Pre-Disturbed Areas***

- Locate project sites and work areas in pre-disturbed areas when possible.

#### ***Selection of Project Site***

- Avoid steep and unstable banks, highly erodible or saturated soils, or highly fractured rock.
- Select project site that minimizes disturbance to aquatic species or habitat.

#### ***Equipment Selection***

- Select equipment that reduces the amount of pressure exerted on the ground surface, and therefore, reduces erosion potential and/or use

overhead or aerial access for transporting equipment across drainage channels. Use equipment that exerts ground pressures of less than 5 or 6 pounds per square inch (PSI) where possible. Low ground pressure equipment includes: wide or high flotation tires (34 to 72 in. wide); dual tires; bogie axle systems; tracked machines; lightweight equipment; and, central tire inflation systems.

### **STREAMBANK STABILIZATION**

#### ***Preservation of Existing Vegetation (SS-2)***

- Preserve existing vegetation in accordance with SS-2. In a streambank environment preservation of existing vegetation provides the following benefits:

##### *Water Quality Protection:*

Vegetated buffers on slopes trap sediment and promote groundwater recharge. The buffer width needed to maintain water quality ranges from 15 to 100 ft. On gradual slopes, most of the filtering occurs within the first 30 ft. Steeper slopes require a greater width of vegetative buffer to provide water quality benefits. This information is intended as general guidance only, refer to the Project Plans and Special Provisions for specific slope and buffer width requirements.

##### *Streambank Stabilization:*

The root system of riparian vegetation stabilizes streambanks by increasing tensile strength in the soil. The presence of vegetation modifies the moisture condition of slopes (infiltration, evapotranspiration, interception) and increases bank stability.

##### *Riparian Habitat*

Buffers of diverse riparian vegetation provide food and shelter for riparian and aquatic organisms. Minimizing impacts to fisheries habitat is a major concern when working near streams and rivers. Riparian vegetation provides shade, shelter, organic matter (leaf detritus and large woody debris), and other nutrients that are necessary for fish and other aquatic organisms. Buffer widths for habitat concerns are typically wider than those recommended for water quality concerns 100-1,500 ft.

When working near watercourses, it is important to understand the work site's placement in the watershed. Riparian vegetation in the headwater streams has a greater impact on overall water quality than vegetation in downstream reaches. Preserving existing vegetation



upstream is necessary to maintain water quality, minimize bank failure, and maximize riparian habitat, downstream of the work site.

***Limitations:***

- Local county and municipal ordinances regarding width, extent and type of vegetative buffer required may exceed the specifications provided here; these ordinances should be investigated prior to construction. This information is intended as general guidance only, refer to the Project Plans and Special Provisions for specific slope and buffer width requirements.

***Streambank Stabilization Specific Installation:***

- As a general rule, the width of a buffer strip between a road and the stream is recommended to be 50 ft plus four times the percent slope of the land, measured between the road and the top of stream bank.

***Hydraulic Mulch (SS-3)***

- Apply hydraulic mulch on disturbed streambanks above mean high water level in accordance with SS-3 to provide temporary soil stabilization.

***Limitations***

- Do not place hydraulic mulch or tackifiers below the mean high water level, as these materials could wash into the channel and impact water quality or possibly cause eutrophication (eutrophication is an algal bloom caused by excessively high nutrient levels in the water).

***Hydroseeding (SS-4)***

- Hydroseed disturbed streambanks in accordance with SS-4.

***Limitations***

- Do not place tackifiers or fertilizers below the mean high water level, as these materials could wash into the channel and impact water quality or possibly cause eutrophication.

***Soil stabilizers (SS-5)***

- Apply soil stabilization to disturbed streambanks in accordance with SS-5.

***Limitations***

- Do not place soil stabilizer below the mean high water level. Soil stabilizer must be environmentally benign and non-toxic to aquatic organisms.

### ***Straw Mulch (SS-6)***

- Apply straw mulch to disturbed streambanks in accordance with SS-6.

#### ***Limitations***

- Do not place straw mulch below the mean high water level, as this material could wash into the channel and impact water quality or possibly cause eutrophication.

### ***Geotextiles, Plastic Covers, and Erosion Control Blankets (SS-7)***

- Install geotextiles, erosion control blankets and plastic as described in SS-7 to stabilize disturbed channels and streambanks. Not all applications should be in the channel, for example, certain geotextile netting may snag fish gills and are not appropriate in fish-bearing streams. Contact NDEP for appropriate applications. Geotextile fabrics that are not biodegradable are not appropriate for in-stream use. Additionally, geotextile fabric or blankets placed in channels must be adequate to sustain anticipated hydraulic forces.

### ***Earth Dikes, Drainage Swales, and Lined Ditches (SS-9)***

- Convey, intercept, or divert runoff from disturbed streambanks using earth dikes, drainage swales, or lined ditches (SS-9).

#### ***Limitations***

- Do not place earth dikes in watercourses, as these structures are only suited for intercepting sheet flow, and should not be used to intercept concentrated flow.
- Appropriately sized outlet protection/velocity dissipation devices (SS-10) must be placed at outlets to minimize erosion and scour.

### ***Outlet Protection/Velocity Dissipation Devices (SS-10)***

- Place outlet protection or velocity dissipation devices at outlets of pipes, drains, culverts, slope drains, diversion ditches, swales, conduits or channels in accordance with SS-10.

### ***Slope Drains (SS-11)***

- Use slope drains to intercept and direct surface runoff or groundwater into a stabilized watercourse, trapping device or stabilized area in accordance with SS-11.

#### ***Limitations***

- Appropriately sized outlet protection/velocity dissipation devices (SS-10) must be placed at outlets to minimize erosion and scour.



**STREAMBANK SEDIMENT CONTROL****Silt Fences (SC-1)**

- Install silt fences in accordance with SC-1 to control sediment. Silt fences should only be installed where sediment-laden water can pond, thus allowing the sediment to settle out.

**Fiber Rolls (SC-5)**

- Install fiber rolls in accordance with SC-5 along contour of slopes above the high water level to intercept runoff, reduce flow velocity, release the runoff as sheet flow and provide removal of sediment from the runoff. In a stream environment, fiber rolls should be used in conjunction with other sediment control methods such as silt fence (SC-1). Install silt fence (SC-1), or other sediment control method along toe of slope above the high water level.

**Gravel Bag Berm (SC-6)**

- A gravel bag berm or barrier can be utilized to intercept and slow the flow of sediment-laden sheet flow runoff in accordance with SC-6. In a stream environment, gravel bag barriers can allow sediment to settle from runoff before water leaves the construction site and can be used to isolate the work area from the live stream.

**Limitations:**

- Gravel bag barriers are not recommended as a perimeter sediment control practice around streams.

**Rock Filter****Description and Purpose:**

Rock filters are temporary erosion-control barriers composed of rock that is anchored in place. Rock filters detain the sediment-laden runoff, retain the sediment, and release the water as sheet flow at a reduced velocity. Typical rock filter installations are illustrated at the end of this Section.

**Applications:**

- Near the toe of slopes that may be subject to flow and rill erosion.

**Limitations:**

- Inappropriate for contributing drainage areas greater than 5 acres.
- Requires sufficient space for ponded water.
- Ineffective for diverting runoff because filters allow water to slowly seep through.

Adapted from Caltrans Construction Site BMPs

- Rock filter berms are difficult to remove when construction is complete.
- Unsuitable in developed areas or locations where esthetics is a concern.

### *Specifications:*

- Rock: open-graded rock, 0.75 to 5 in. for concentrated flow applications.
- Woven wire sheathing: 1 in. diameter, hexagonal mesh, galvanized 20-gauge (used with rock filters in areas of concentrated flow).
- In construction traffic areas, maximum rock berm heights should be 12 in. Berms should be constructed every 300 ft on slopes less than 5%, every 200 ft on slopes between 5% and 10%, and every 100 ft on slopes greater than 10%.

### *Maintenance:*

- Inspect berms before and after each significant rainfall event and weekly throughout the rainy season.
- Reshape berms as needed and replace lost or dislodged rock, and/or filter fabric.
- Inspect for sediment accumulation; remove sediments when depth reaches one-third of the berm height or 12 in., whichever occurs first.
- When project is complete remove the fabric.

### **Portable Precast Concrete Barrier Rail (PPCBR)**

#### *Description and Purpose:*

This is temporary sediment control that uses PPCBR to form the sediment deposition area, or to isolate the near-bank construction area. Install PPCBR at toe of slope in accordance with procedures described in Clear Water Diversion (NS-5).

Barriers are placed end-to-end in a pre-designed configuration and gravel-filled bags are used at the toe of the barrier and also at their abutting ends to seal and prevent movement of sediment beneath or through the barrier walls.

#### *Appropriate Applications:*

- This technique is useful at the toe of embankments, cuts or fills slopes.

#### *Limitations:*

- The PPCBR method should not be used to dewater a project site, as the barrier is not watertight.

#### *Standards and Specifications:*

- Refer to NS-5 "Clear Water Diversion" for standards and specifications.



**INSTREAM CONSTRUCTION SEDIMENT CONTROL**

There are three different options currently available for reducing turbidity while working in a stream or river. The stream can be isolated from the area in which work is occurring by means of a water barrier, the stream can be diverted around the work site through a pipe or temporary channel, or one can employ construction practices that minimize sediment suspension.

Whatever technique is implemented, an important thing to remember is that dilution can sometimes be the solution. A probable "worst time" to release high TSS into a stream system might be when the stream is very low; summer low flow, for example. During these times, the flow may be low while the biological activity in the stream is very high. Conversely, the addition of high TSS or sediment during a big storm discharge might have a relatively low impact, because the stream is already turbid, and the stream energy is capable of transporting both suspended solids, and large quantities of bedload through the system. The optimum time to "pull" in-stream structures may be during the rising limb of a storm hydrograph.

***Techniques to Minimize Total Suspended Solids (TSS)***

- Clean, washed gravel - Using clean, washed gravel decreases solid suspension, as there are fewer small particles deposited in the stream.
- Excavation using a large bucket - Each time a bucket of soil is placed in the stream a portion of soil is suspended. Approximately the same amount is suspended whether a small amount of soil is placed in the stream, or a large amount. Therefore, using a large excavator bucket instead of a small one will reduce the total amount of soil that washes downstream.
- Use of dozer for backfilling - Using a dozer for backfilling instead of a backhoe follows the same principles - the fewer times soil is deposited in the stream, the less soil will be suspended.
- Partial dewatering with a pump - Partially dewatering a stream with a pump reduces the amount of water, and thus the amount of water that can suspend sediment.

***Washing Fines******Definition and Purpose:***

Washing fines is an "in-channel" sediment control method, which uses water, either from a water truck or hydrant, to wash any stream fines that were brought to the surface of the channel bed during restoration, back into the interstitial spaces of the gravel and cobbles.

The purpose of this technique is to reduce or eliminate the discharge of sediment from the channel bottom during the first seasonal flows, or 'first flush'. Sediment should not be allowed into stream channels; however, occasionally in-channel restoration work will involve moving or otherwise disturbing fines (sand and silt-sized particles) that are already in the stream, usually below bankfull discharge elevation. Subsequent re-watering of the channel can result in a plume of turbidity and sedimentation.

This technique washes the fines back into the channel bed. Bedload materials, including gravel cobbles, boulders and those fines, are naturally mobilized during higher storm flows. This technique is intended to delay the discharge until the fines would naturally be mobilized.

### *Appropriate Applications:*

- This technique should be used when construction work is required in channels. It is especially useful in intermittent or ephemeral streams in which work is performed "in the dry", and which subsequently become re-watered.

### *Limitations:*

- The stream must have sufficient gravel and cobble substrate composition.
- The use of this technique requires consideration of time of year and timing of expected stream flows.
- The optimum time for the use of this technique is in the fall, prior to winter flows.
- Consultation with and approval from Nevada Department of Wildlife and NDEP may be required.

### *Standards and Specifications:*

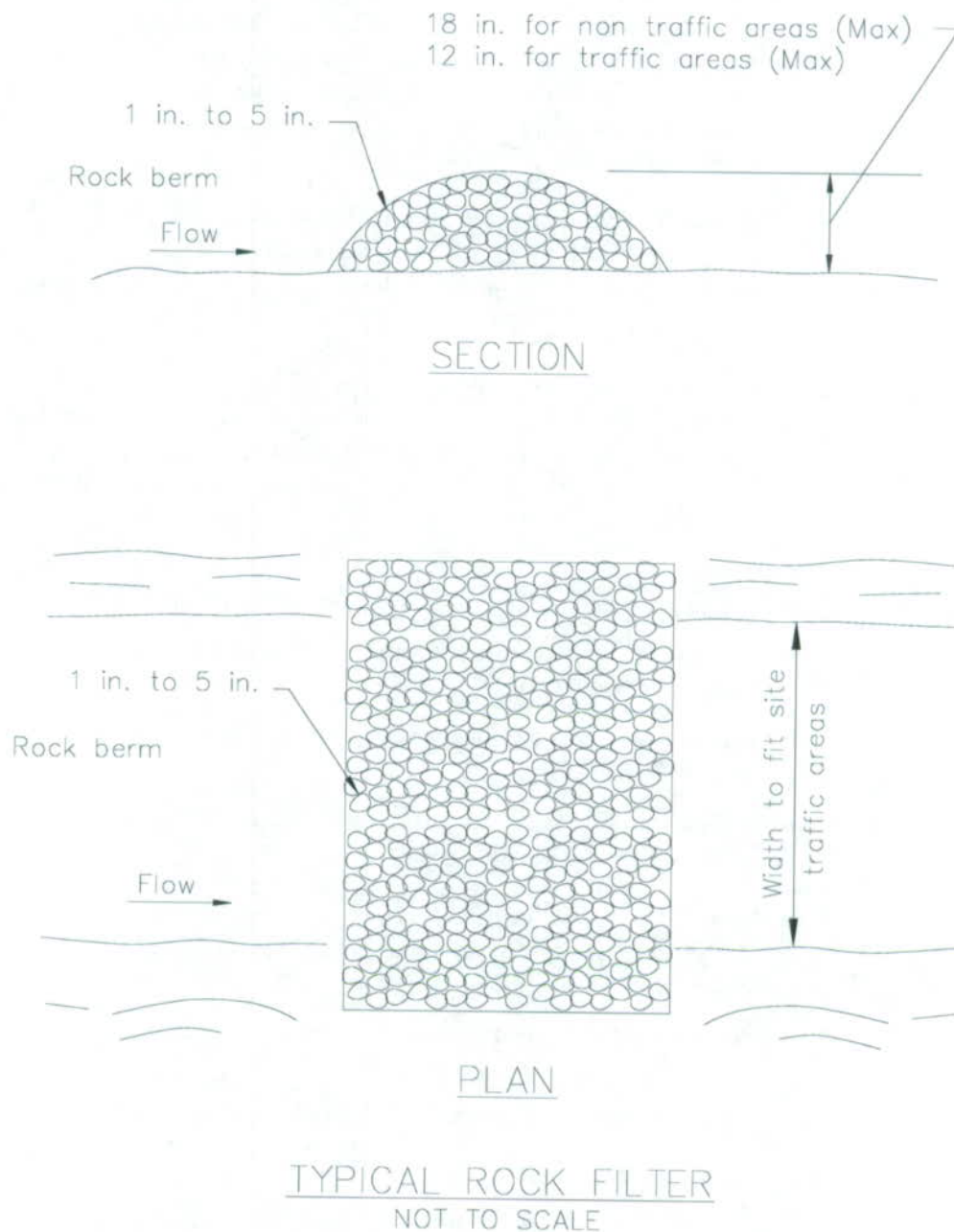
- Apply sufficient water to wash fines, but not cause further erosion or runoff.
- Apply water slowly and evenly to prevent runoff and erosion.
- Consult with Nevada Department of Wildlife and NDEP for specific water quality requirements of applied water (e.g. chlorine).

### *Inspection and Maintenance:*

#### Inspection and Maintenance

- None necessary
- Inspect all BMPs daily during construction.
- Inspect and repair equipment (for damaged hoses, fittings, and gaskets).

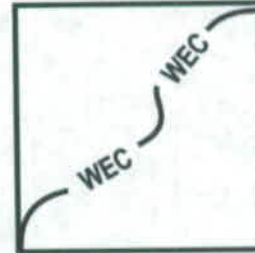
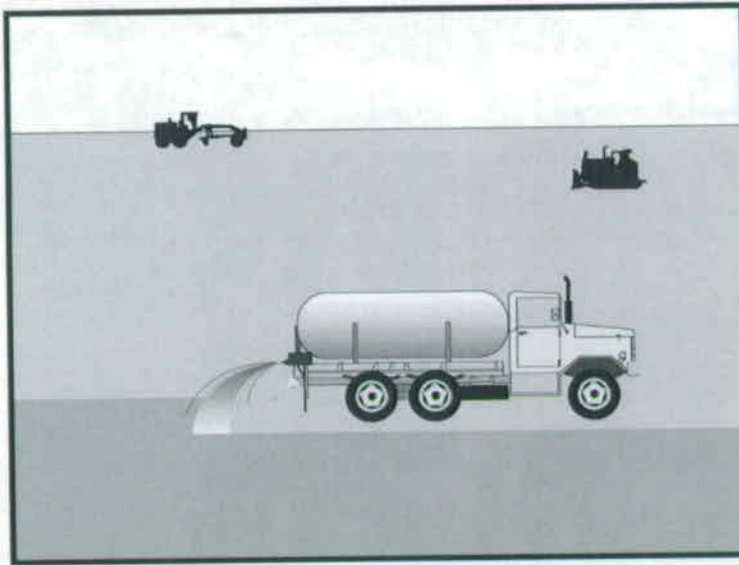




# Wind Erosion Control

**SS-13**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

**Definition and Purpose** Dust or wind erosion control consists of applying water, soil stabilizers, dust palliatives, or other soil stabilization BMP as necessary to prevent or alleviate dust nuisance and to comply with state and local permit regulations. Dust control shall be applied in accordance with NDOT Standard Specifications Section 107. Covering of stockpiles or exposed soil areas with blankets, mats, mulches, is an alternative to applying water, soil stabilizers, or dust palliatives.

**Appropriate Applications** This practice is implemented on all exposed soils subject to wind erosion.

**Limitations** Effectiveness depends on soil, temperature, humidity and wind velocity.

- Standards and Specifications**
- Water shall be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles that will ensure even distribution.
  - All distribution equipment shall be equipped with a positive means of shutoff.
  - Unless water is applied by means of pipelines, at least one mobile unit shall be available at all times to apply water or dust palliative to the project.
  - If reclaimed wastewater is used, the sources and discharge must meet NDEP requirements. Non-potable water shall not be conveyed in tanks or drainpipes that will be used to convey potable water and there shall be no connection between potable and non-potable supplies. Non-potable tanks, pipes and other conveyances shall be marked "NON-POTABLE WATER - DO NOT DRINK."



- Materials applied as temporary soil stabilizers will also provide wind erosion control benefits.
  - Monitoring is only required in Clark County and is performed visually.
  - In Clark County, construction activity must cease if wind is causing Fugitive Dust in excess of 20% or 50% opacity (depending on analysis method), or if wind is causing a plume 100 yards or more in length (See Clark County Air Regulations).
  - In Washoe county, construction activity must cease if dust generation cannot be satisfactorily controlled or upon request of the AQMD, i.e. under high wind conditions (See Washoe County Air Quality Management Division Regulations).
  - In Clark County, contractor must document and retain records of all use of dust palliatives on the Dust Control Permit Forms.
  - Application of dust palliatives are subject to sample collection and testing for compliance with applicable regulations of the Nevada Administrative Code and the requirements set for in the Interim Policy On Dust Palliative Use In Clark County.
- Maintenance and Inspection
- Check areas protected to ensure coverage.
  - Implement requirements of the Standard Specifications Section 107, 210 and 637.

## Section 4

# Temporary Sediment Control Best Management Practices

### 4.1 Temporary Sediment Control Practices

Temporary sediment control practices include those practices that intercept and slow or detain the flow of storm water to allow sediment to settle and be trapped.

Temporary sediment control practices can consist of installing temporary linear sediment barriers (such as silt fence, sandbag barrier, and straw bale barrier); providing fiber rolls, gravel bag berms, or check dams to break up slope length or flow; or constructing a temporary desilting basin, sediment trap, or sediment basin. Linear sediment barriers are typically placed below the toe of exposed and erodible slopes, down slope of exposed soil areas, around temporary soil stockpiles, and at other appropriate locations along the site perimeter.

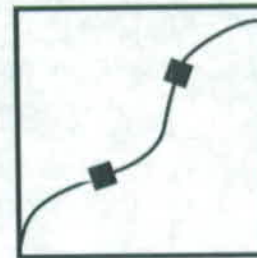
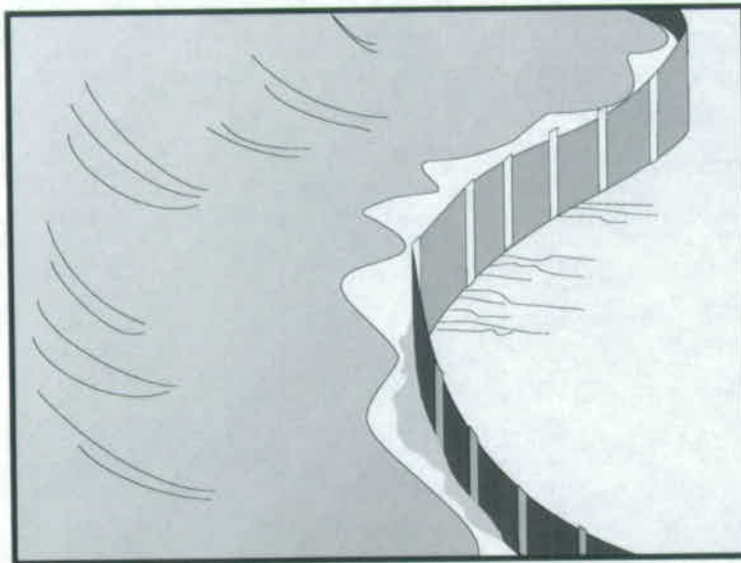
Temporary sediment control practices shall be implemented in conformance with the criteria presented in Section 2, Selecting and Implementing Construction Site Best Management Practices (BMPs), of this Manual. Temporary sediment control practices include the BMPs listed in Table 4-1.

Table 4-1 TEMPORARY SEDIMENT CONTROL BMPs	
ID	BMP NAME
SC-1	Silt Fence
SC-2	Sediment Basin
SC-3	Sediment Trap
SC-4	Check Dam
SC-5	Fiber Rolls
SC-6	Gravel Bag Berm
SC-7	Street Sweeping and Vacuuming
SC-8	Storm Drain Inlet Protection

The remainder of this Section shows the working details for each of the temporary sediment control BMPs.



Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

## Definition and Purpose

A silt fence is a temporary linear sediment barrier of permeable fabric designed to intercept and slow the flow of sediment-laden sheet flow runoff. Silt fences allow sediment to settle from runoff before water leaves the construction site.

## Appropriate Applications

Silt fences are placed:

- Along the perimeter of a project.
- Below the toe of exposed and erodible slopes.
- Along slope contours for longer slope lengths.
- Down-slope of exposed soil areas.
- Around temporary stockpiles.
- Along streams and channels.

## Limitations

- Not effective unless trenched and keyed in.
- The maximum length of slope draining to any point along the silt fence shall be 200 ft.
- Slope of area draining to fence shall be less than 1:1.
- Limit to locations suitable for temporary ponding or deposition of sediment.
- Fabric life span generally limited to between five and eight months. Longer periods may require fabric replacement.
- Silt fences shall not be used in concentrated flow areas.

- Design in accordance with Page 5 of this working detail (BMP).
- Must be maintained by removing sediment accumulations and repairing damaged areas.
- Must be removed and disposed of.
- Don't use below slopes subject to creep, slumping, or landslides.
- Don't use in streams, channels, or anywhere flow is concentrated.
- Don't use silt fences to divert flow.

**Standards and Specifications****Design and Layout**

- Not intended for use as mid-slope protection on slopes steeper than 4:1.
- For slopes steeper than 2:1 and that contain a high number of rocks or large dirt clods that tend to dislodge, it may be necessary to install additional protection fencing immediately adjacent to the bottom of the slope, prior to installing silt fence. Additional protection may be required in accordance with Standard Specification Section 616.
- For slopes adjacent to water bodies or Environmentally Sensitive Areas (ESAs), additional temporary soil stabilization BMPs (SS-1 - SS-11) shall be used.

**Materials**

- Silt fence fabric shall be woven polypropylene with a minimum width of 35 in. and a minimum tensile strength of 100 lbs. The fabric shall conform to the requirements in ASTM designation D4632 and shall have an integral reinforcement layer. The reinforcement layer shall be a polypropylene, or equivalent, net provided by the manufacturer. The permittivity of the fabric shall be between  $0.1 \text{ sec}^{-1}$  and  $0.15 \text{ sec}^{-1}$  in conformance with the requirements in ASTM designation D4491. Contractor must submit certificate of compliance in accordance with Standard Specifications Section 724.
- Wood stakes shall be commercial quality lumber of the size and shape shown on the plans. Each stake shall be free from decay, splits or cracks longer than the thickness of the stake or other defects that would weaken the stakes and cause the stakes to be structurally unsuitable. Wood stakes are in conformance with Standard Specifications Section 637.
- Fabric shall be fastened to the stakes in accordance with manufacturer's recommendations.



- If steel bar reinforcement is used, it shall be equal to a number four (4) or greater. End protection safety caps shall be provided for the tops any exposed bar reinforcement.

## **Installation**

- Generally, silt fences shall be used in conjunction with soil stabilization source controls up slope to provide effective control.
- Trenches shall not be excavated wider and deeper than necessary for proper installation of the temporary linear sediment barriers.
- Excavation of the trenches shall be performed immediately before installation of the temporary linear sediment barriers. The bottom of the silt fence shall be keyed-in a minimum of 6 in.
- Construct silt fences with a setback of at least 10 ft. from the toe of a slope. Where setback is not practical, the silt fence may be constructed at the toe of the slope, but shall be constructed as far from the toe of the slope as practical to allow for equipment (i.e. Bobcat) access for removal of accumulated sediment.
- Construct the length of each reach between the cross barriers so that the change in base elevation along the reach does not exceed  $\frac{1}{3}$  the height of the barrier; in no case shall the reach exceed 500 ft.
- Cross barriers shall be a minimum of  $\frac{1}{3}$  and a maximum of  $\frac{1}{2}$  the height of the linear barrier. Cross barriers shall be installed at the ends of fence sections (every 500 ft, see detail) or at joints in the fabric to minimize overloading of the fence due to sediment transport parallel to the fence line.
- Install in accordance with Page 5 of this Fact Sheet.

## **Maintenance and Inspection**

- Repair undercut silt fences.
- Repair or replace split, torn, slumping, or weathered fabric.
- Inspect silt fence when rain is forecast. Perform necessary maintenance, or maintenance as required by SWPPP.
- Inspect silt fence following rainfall events. Perform maintenance as necessary, or as required by the SWPPP.
- Maintain silt fences to provide an adequate sediment holding capacity. Sediment shall be removed when the sediment accumulation reaches one-third ( $\frac{1}{3}$ ) of the barrier height. Removed sediment shall be incorporated in the project at locations designated by the RE or disposed of outside the highway right-of-way in conformance with the Standard Specifications.

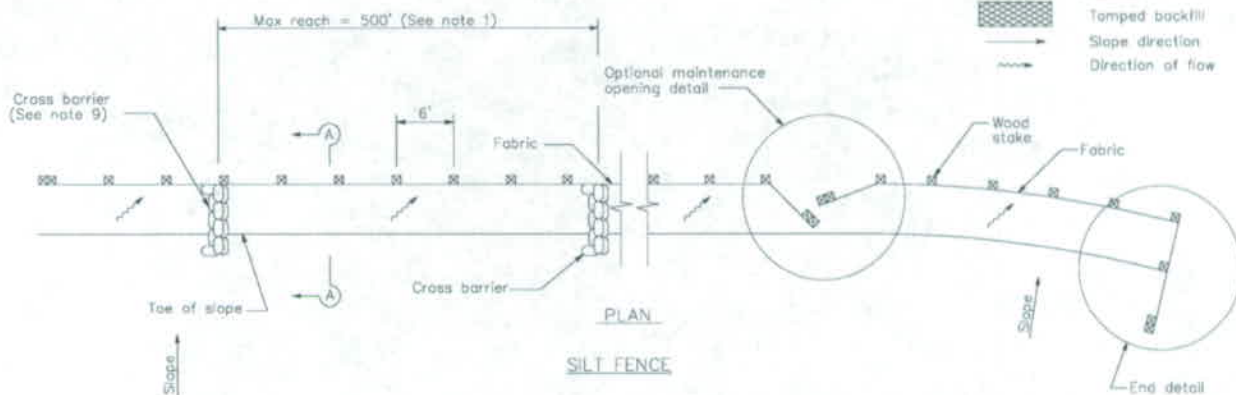
- Silt fences that are damaged and become unsuitable for the intended purpose, as determined by the RE, shall be removed from the site of work, disposed of outside the highway right-of-way in conformance with the Standard Specifications, and replaced with new silt fence barriers.
- Holes, depressions or other ground disturbance caused by the removal of the temporary silt fences shall be backfilled and repaired in conformance with the Standard Specifications.
- Remove silt fence when no longer needed or as required by the Engineer. Fill and compact postholes and anchorage trench, remove sediment accumulation, re-seed or re-vegetate as appropriate, and grade fence alignment to blend with adjacent ground.



# Silt Fence

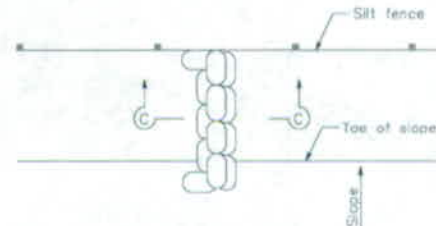
**SC-1**

Adapted from Caltrans Construction Site BMPs



## NOTES

1. Construct the length of each reach so that the change in base elevation along the reach does not exceed  $1/3$  the height of the linear barrier, in no case shall the reach length exceed 500'.
2. The last 6' of fence shall be turned up slope (see End Detail).
3. Stake dimensions are nominal.
4. Dimension may vary to fit field condition. Room for maintenance shall be provided when practical.
5. Stakes shall be spaced at 6' maximum and shall be positioned on downstream side of fence.
6. Stakes to overlap and fence fabric to fold around each stake one full turn. Secure fabric to stake with 4 staples.
7. Stakes shall be driven tightly together to prevent potential flow-through of sediment at joint. The tops of the stakes shall be secured with wire.
8. For end stake, fence fabric shall be folded around two stakes one full turn and secured with 4 staples.
9. Cross barriers shall be a minimum of  $1/3$  and a maximum of  $1/2$  the height of the linear barrier.
10. Maintenance openings shall be constructed in a manner to ensure sediment remains behind silt fence.
11. Joining sections shall not be placed at sump locations.
12. Sandbag rows and layers shall be offset to eliminate gaps.

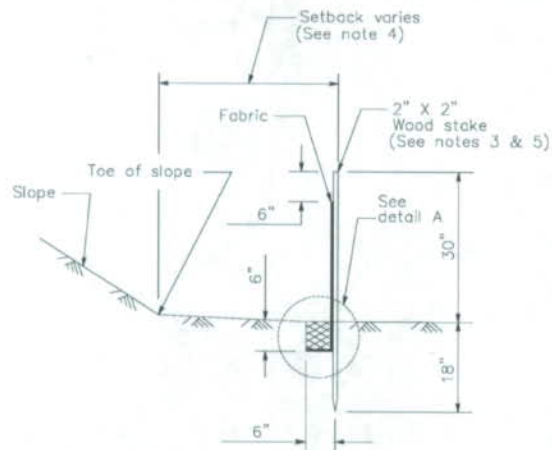


CROSS BARRIER DETAIL

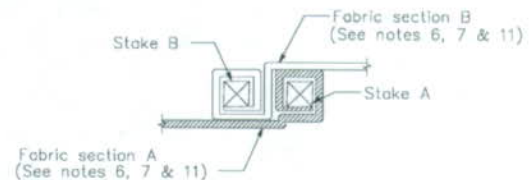


SECTION C-C

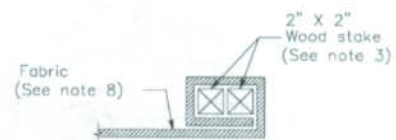
## LEGEND



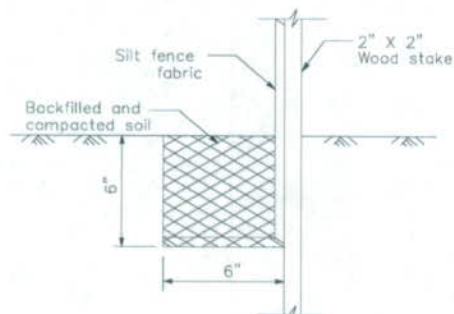
SECTION A-A



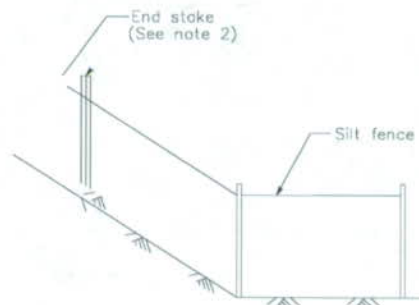
JOINING SECTION DETAIL (TOP VIEW)



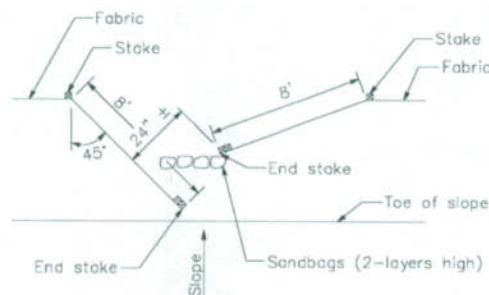
END STAKE DETAIL (TOP VIEW)



DETAIL A



END DETAIL



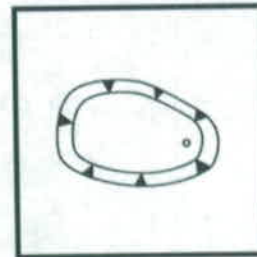
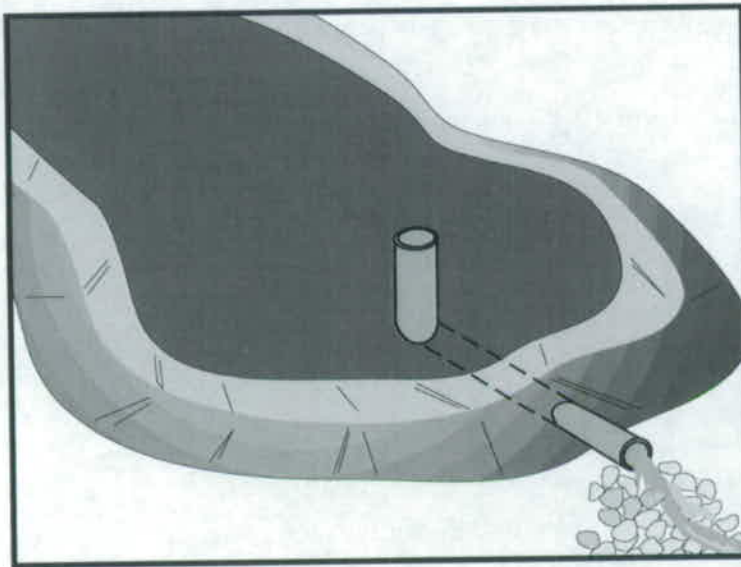
OPTIONAL MAINTENANCE OPENING DETAIL  
(SEE NOTE 10)



# Sediment Basin

**SC-2**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

### Definition and Purpose

A sediment basin is a temporary basin formed by excavation and/or constructing an embankment so that sediment-laden runoff is temporarily detained under quiescent conditions, allowing sediment to settle out before the runoff is discharged.

### Appropriate Applications

Sediment basins shall be designed in accordance with Section I.B. of the *General Permit for Storm Water Discharges Associated with Construction Activity* (General Permit) where sediment basins are the only control measure proposed for the site. Additional reference may come from the NDOT Drainage Design Manual and Section 2.5 of this manual. Sediment basins shall be considered for use:

- On construction projects with disturbed areas during the rainy season; and
- Where sediment-laden water may enter the drainage system or watercourses; and
- At outlets of disturbed soil areas with areas between 5 and 10 acres.
- In the Lake Tahoe Basin as needed to retain and treat the 20-year, 1-hour storm.

### Limitations

- Due to the high cost and complex design and construction requirements, alternative sediment control BMPs must be thoroughly investigated before selecting temporary sediment basins.
- Requires large surface areas to permit settling of sediment.
- It is recommended to size basins for a drainage area of 5-10 acres, however, basins may be designed for drainage areas with an absolute

**Standards and Specifications**

maximum of 75 acres. For drainage areas greater than 75 acres it may be necessary to construct more than one sediment basin.

- Not to be located in live streams.
- If safety is a concern, basins may require protective fencing.
- Size may be limited by availability of right-of-way.
- Limit the contributing area to the sediment basin to only the runoff from the disturbed soil areas. Use temporary concentrated flow conveyance controls to divert runoff from undisturbed areas away from the sediment basin.
- Sediment basins shall be designed to have a capacity equivalent to 3,600 ft<sup>3</sup> of storage per acre of contributory area.
- Sediment basins should be used in combination with appropriate soil stabilization controls (See SS Fact Sheets).
- The length of the basin shall be more than twice the width of the basin. Length shall be determined by measuring the distance between the inlet and the outlet.
- It is recommended that the depth be no less than 3 ft. and not greater than 5 ft.
- Basins with an impounding levee greater than 5 ft. tall, measured from the lowest point of the impounding area to the highest point of the levee, and basins capable of impounding more than 36,000 ft<sup>3</sup>, shall be designed by a professional Civil Engineer registered with the state of Nevada. The design shall include maintenance requirements, including sediment and vegetation removal, to ensure continuous function of the basin outlet and bypass structures. A Nevada Division of Water Resources permit is required to construct, reconstruct, or alter a dam that has a crest height 20 feet or higher, as measured from the downstream toe to the crest, or has a crest height less than 20 feet but will impound 20 acre-feet or more of movable material. This provision does not pertain to United States Bureau of Reclamation or United States Army Corps of Engineer Projects.
- Design and locate sediment basins so that they can be maintained. Construct sediment basins prior to the rainy season and soil disturbing activities.
- Sediment basins, regardless of size and storage volume, shall include features to accommodate overflow or bypass flows that exceed the design storm event. The design storm event for Lake Tahoe Basin is the 20-year, 1-hour event; and for the remainder of Nevada, is the 2-year, 24-hour event.



Adapted from Caltrans Construction Site BMPs

- Basins shall be designed to drain within 72 hours following storm events. Disease vector control regulations require 7-day maximum dewatering time to apply during summer months (April- September) only. Basins should also have a low flow channel in the bottom so water is concentrated rather than spread when the basin is near empty to facilitate spraying for mosquitoes.
- The outflow from the sediment basin shall be provided with outlet protection to prevent erosion and scouring of the embankment and channel.
- Basin shall be located: (1) by excavating a suitable area or where a low embankment can be constructed across a swale, (2) where post-construction (permanent) detention basins will be constructed, (3) where failure would not cause loss of life or property damage, and (4) where the basins can be maintained on a year-round basis to provide access for maintenance, including sediment removal and sediment stockpiling in a protected area, and to maintain the basin to provide the required capacity.
- Areas under embankments, structural works, and sediment basin must be cleared, stripped of vegetation in accordance with Standard Specifications Section 201, "Clearing and Grubbing".
- Earthwork shall be in accordance with Standard Specifications Section 203 "Excavation and Embankment". Contractor is specifically directed to Standard Specifications Section 203, "Compaction, Embankment".
- Basin inlets shall be located to maximize travel distance to the basin outlet.
- Rock or vegetation shall be used to protect the basin inlet and slopes against erosion.
- A forebay is a settling basin or plunge pool constructed at the inlet of the basin that may be provided to remove debris and larger particles and can be cleaned on a more frequent basis.
- Principal outlet shall consist of a corrugated metal, high density polyethylene (HDPE), or reinforced concrete riser pipe with dewatering holes and an anti-vortex device and trash rack attached to the top of the riser, to prevent floating debris from flowing out of the basin or obstructing the system. This principal structure shall be designed to accommodate the design storm inflow (as shown in schematics below).
- Structure shall be placed on a firm, smooth foundation with the base securely anchored with concrete or other means to prevent floatation

(as shown in schematics below).

- Attach riser pipe (watertight connection) to a horizontal pipe (barrel) that extends through the embankment to toe of fill. Provide anti-seep collars on the barrel (as shown in schematics below).
- Provide anti-seep collars on the barrel that are designed to increase the effective length along the outside of the barrel by 10%. Collars should project a minimum of 1.5 ft. radially outward from the outside of the pipe. Ensure that adequate cover is provided for the anti-seep collars. Cleanout level shall be clearly marked on the riser pipe.
- Avoid dewatering of groundwater to the sediment basin during the rainy season.
- Barbed wire shall be provided around each sediment basin to prevent unauthorized entry to the basin or if safety is a concern. Fencing shall be in accordance with Standard Specifications Sections 616 "Fencing" and 724 "Barbed Wire".
- One of the dewatering configurations shown below for the principal outlet may be used. The Contractor shall verify that the outlet is properly designed to handle the design and peak flows.

**Outlet #1, See Page 6**

- Perforate the top one-third of the riser with 0.5 in. diameter holes spaced 8 in. vertically and 10 in. - 12 in. horizontally.
- Place 0.75 in. gravel over perforated holes to approximately 2 in. minimum thickness to assist in prevention of clogging of dewatering holes. Gravel will naturally settle into a cone surrounding the riser pipe.

**Outlet #2, See Page 7**

- Perforate the lower one-half of the riser pipe with 0.5 in. diameter holes spaced approximately 3 in. apart, in each outside valley (corrugated metal pipe).
- Place 0.75 in. gravel over perforated holes to approximately 2 in. minimum thickness to assist in prevention of clogging of dewatering holes. Gravel will naturally settle into a cone surrounding the riser pipe.

**Outlet #3, See Page 8**

- Provide two 1 in. diameter holes above the sediment storage volume on opposite sides of the non-perforated riser pipe. This

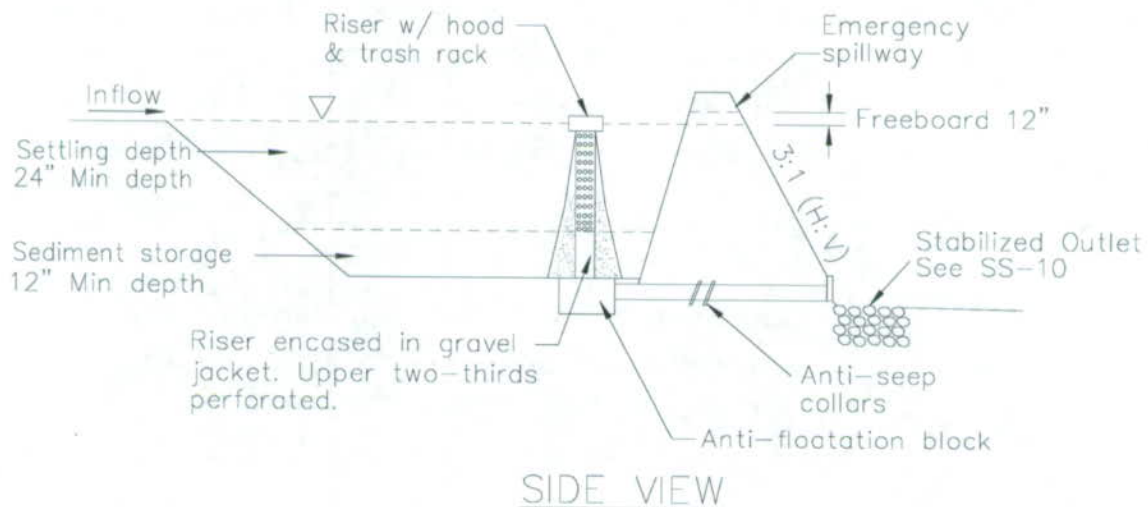
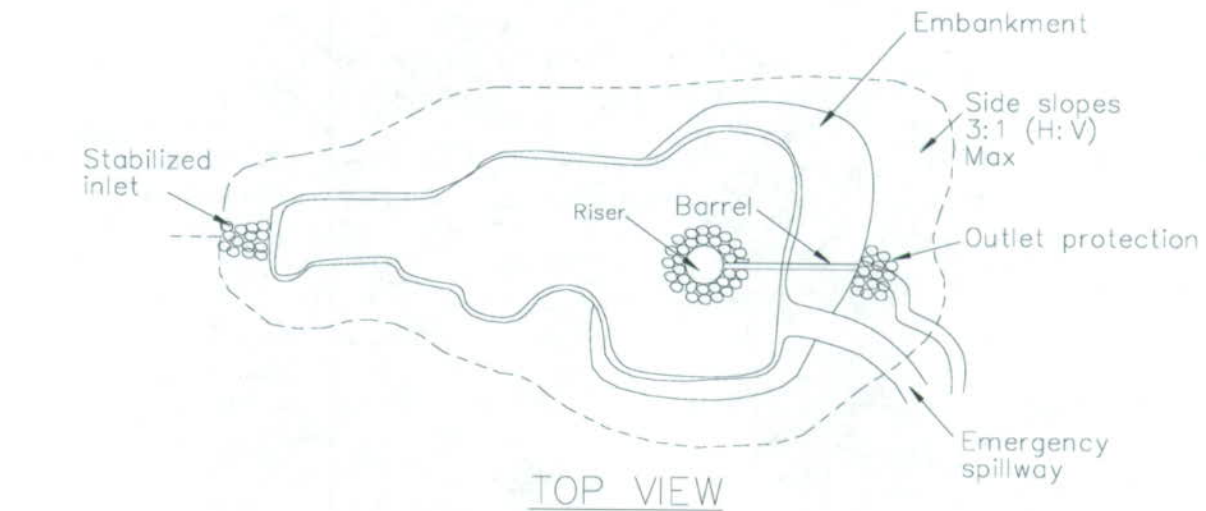


will typically provide sufficient detention time for basins to drain approximately 10 acres.

- Construct an emergency spillway to accommodate flows not carried by the principal spillway. Spillway shall consist of an open channel (earthen or vegetated) over undisturbed material (not fill) or constructed of a non-erodible riprap.
- Spillway control section, which is a level portion of the spillway channel at the highest elevation in the channel, shall be a minimum of 20 ft. in length.
- Use outlet protection at the pipe outlet. See BMP SS-10, "Outlet Protection/Velocity Dissipation Devices".

## Maintenance and Inspection

- Inspect temporary sediment basins before and after rainfall events and weekly during the rest of the rainy season. During extended rainfall events, inspect at least every 24 hours.
- Examine basin banks for seepage and structural soundness.
- Check inlet and outlet structures and spillway for any damage or obstructions. Repair damage and remove obstructions as needed.
- Check inlet and outlet area for erosion and stabilize if required.
- Remove accumulated sediment when its volume reaches one-third the volume of the sediment trap. Properly dispose of sediment and debris removed from the trap in accordance to the Standard Specification Section 107.
- Check fencing for damage and repair as needed.
- Embankments shall be constructed to be improved using materials such as clay, geomembranes, grout or cement.
- Follow dam safety regulations if applicable (see above).
- If there is potential for dam failure, a competent geotechnical engineer shall design or review embankment details or specifications.
- All design standards/guidelines should match the AASHTO Model Drainage Manual. Exceptions must be approved by Chief Hydraulics Engineer.



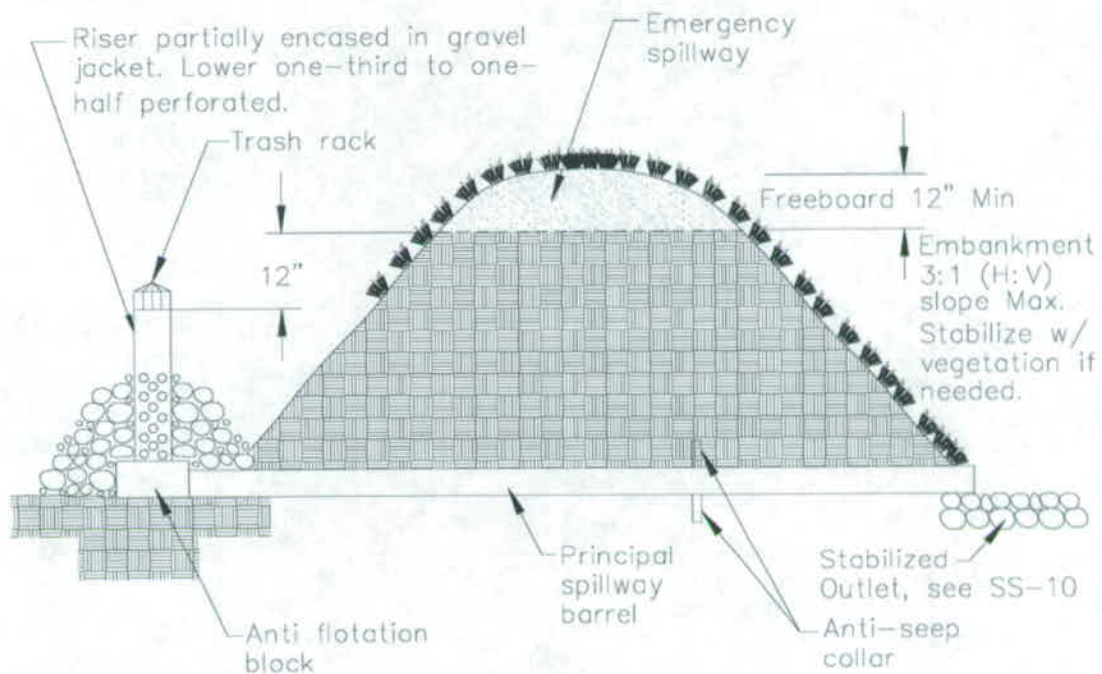
TYPICAL TEMPORARY SEDIMENT BASIN – OUTLET #1  
NOT TO SCALE



# Sediment Basin

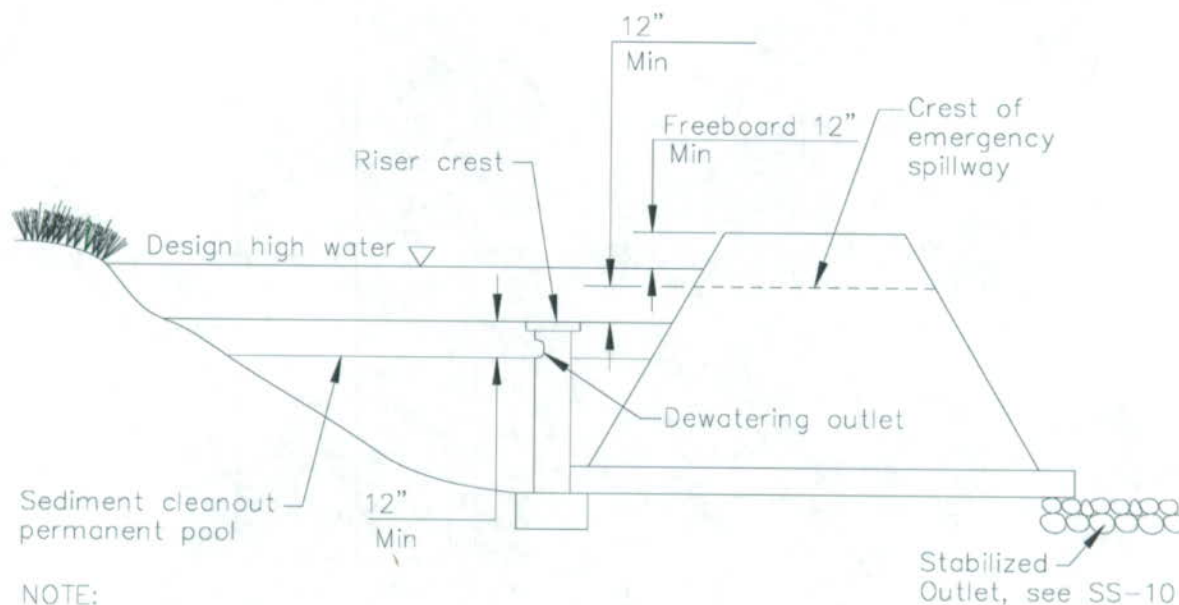
SC-2

Adapted from Caltrans Construction Site BMPs



NOTE:  
This outlet provides  
complete draining of pool.

TYPICAL TEMPORARY SEDIMENT BASIN – OUTLET #2  
NOT TO SCALE



**NOTE:**

This outlet provides no drainage for permanent pool.

## TYPICAL TEMPORARY SEDIMENT BASIN – OUTLET #3

NOT TO SCALE

**NOTE:**

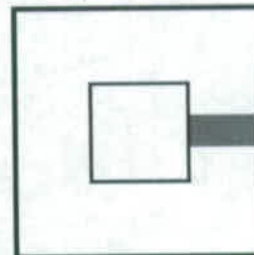
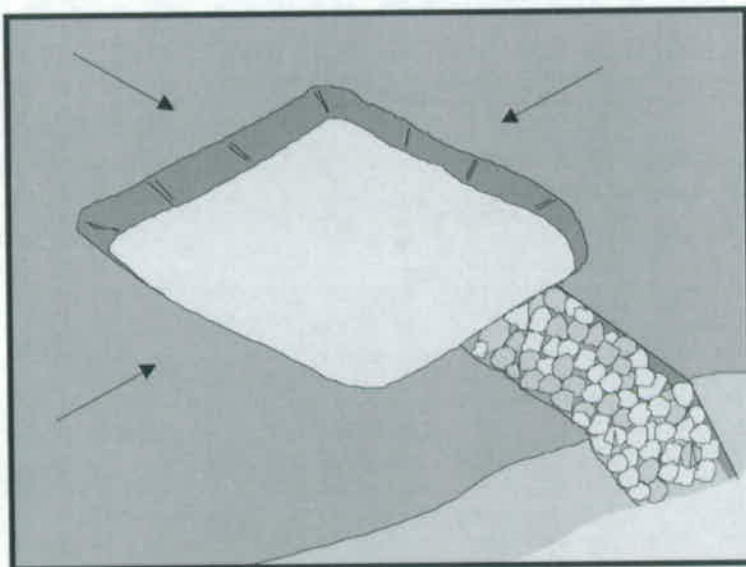
DIMENSIONS REPRESENT A SIZE RANGE FOR MOST TYPICAL INSTALLATIONS. DESIGNER SHALL VERIFY THAT THE OUTLET IS PROPERLY DESIGNED TO HANDLE THE DESIGN AND PEAK FLOWS.



# Sediment Trap

**SC-3**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

## Definition and Purpose

A sediment trap is a temporary containment area that allows sediment in collected storm water to settle out during infiltration or before the runoff is discharged through a stabilized spillway. Sediment traps are formed by excavating a depression or constructing an earthen embankment or other check dam across a drainageway.

## Appropriate Applications

- Sediment traps may be used on construction projects where the drainage area is less than 5 acres to provide temporary storage and settling time for runoff. Traps should be placed to intercept sediment-laden storm water prior to entering a storm drain or watercourse.
- This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary. NDOT approval must be obtained if additional Right-of-Way (ROW) is needed for this facility or the facility will cause negative impacts to NDOT ROW or adjacent property owners.
- As a supplemental control to soil stabilization BMPs, sediment traps provide additional protection for a water body or for reducing sediment before it enters a drainage system.

## Limitations

- Requires large surface areas to permit infiltration and/or settling of sediment.
- Not appropriate for drainage areas greater than 5 acres.
- Only removes large and medium sized particles and requires upstream erosion control.
- Attractive and dangerous to children, requiring protective fencing.

**Standards and Specifications**

- Not to be located in live streams.
- Size may be limited by availability of Right-of-Way.
- Design in accordance with page 4 of this Fact Sheet.
- Construct sediment traps prior to rainy season and soil disturbing activities.
- Traps shall be sized to accommodate a settling zone and sediment storage zone. The 2-year, 24-hour rain event shall be used for temporary sediment trap sizing, unless working in the Lake Tahoe Basin, where the 20-year, 1-hour event shall be used.
- The minimum recommended volumes for settling and sediment storage are 67 yd<sup>3</sup>/acre and 33 yd<sup>3</sup>/acre of contributing drainage area respectively. These minimum volumes are based on 0.5 in. over a 24-hr period.
- Multiple traps and/or additional volume may be required to accommodate site-specific rainfall and soil conditions.
- Traps with an impounding levee greater than 5 ft. tall, measured from the lowest point to the impounding area to the highest point of the levee, and traps capable of impounding more than 35,000 ft<sup>3</sup>, shall be designed by a professional Civil Engineer registered with the state of Nevada. The design shall include maintenance requirements, including sediment and vegetation removal, to ensure continuous function of the trap outlet and bypass structures.
- Earthwork shall be in accordance with Standard Specifications Section 203 – Excavation and Embankment. Contractor is specifically directed to Standard Specifications Section 203, "Compaction, Embankment".
- Areas under embankments, structural works, and sediment traps shall be cleared and stripped of vegetation in accordance with Standard Specifications Section 201 – "Clearing and Grubbing".
- Use rock or vegetation to protect the trap outlets against erosion.
- Fencing, in accordance with Standard Specifications Section 616 – "Fencing", shall be provided to prevent unauthorized entry. Fencing (Type C – NV – 4B) as shown in the NDOT Standard Plans Sheet R-6.1.2.

**Maintenance and Inspection**

- Inspect sediment traps before and after rainfall events and weekly during the rest of the rainy season. During extended rainfall events, inspect sediment traps at least every 24 hours.

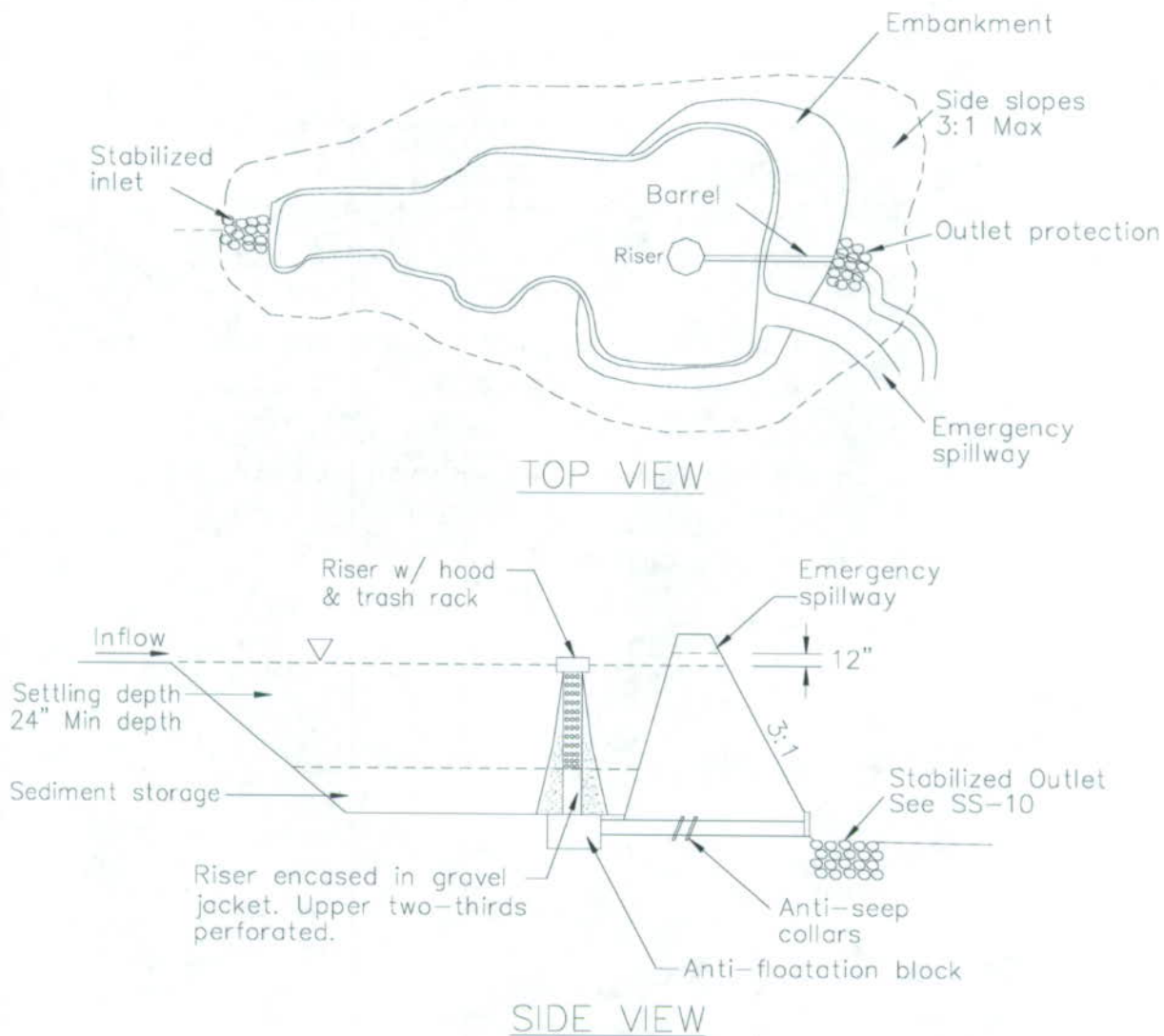


# Sediment Trap

**SC-3**

Adapted from Caltrans Construction Site BMPs

- If captured runoff has not completely infiltrated within 72 hours, the sediment trap should be dewatered. Disease vector control regulations require 7-day maximum dewatering time to apply during summer months (April- September) only. Basins should also have a low flow channel in the bottom so water is concentrated rather than spread when the basin is near empty to facilitate spraying for mosquitoes.
- Inspect trap banks for seepage and structural soundness.
- Inspect outlet structure and spillway for any damage or obstructions. Repair damage and remove obstructions as needed.
- Inspect outlet area for erosion and stabilize if required.
- Remove accumulated sediment when the volume has reached one-third the original trap volume.
- Properly dispose of sediment and debris removed from the trap according to Standard Specifications Section 107.
- Inspect fencing for damage and repair as needed.



TYPICAL SEDIMENT TRAP

NOT TO SCALE

FIGURE 1



# Sediment Trap

SC-3

Adapted from Caltrans Construction Site BMPs

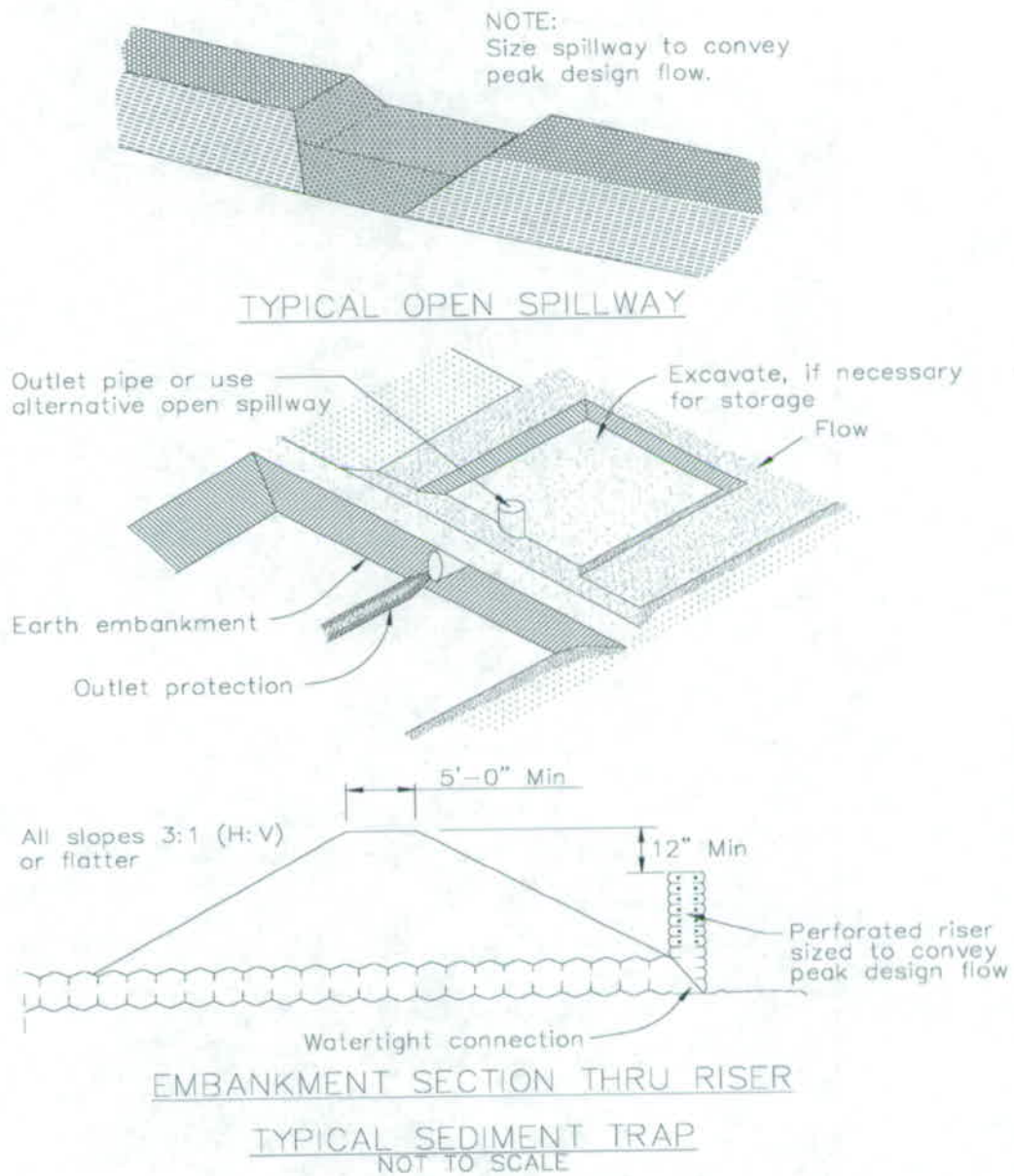
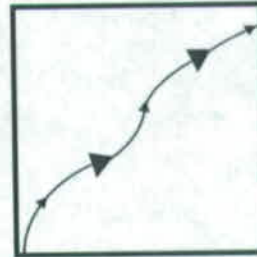
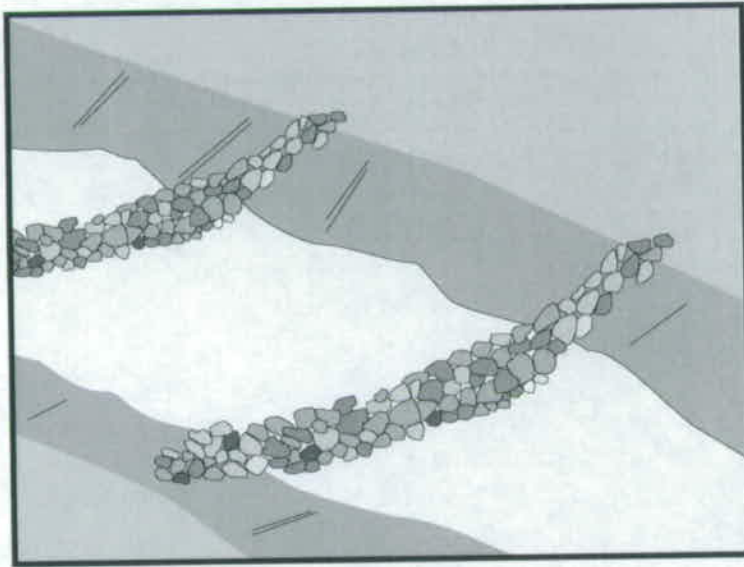


FIGURE 2

# Check Dams

**SC-4**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

## Definition and Purpose

A check dam is a device constructed of rock, gravel bags, fiber rolls, or reusable products manufactured by one of the companies listed in the QPL placed across a natural or man-made channel or drainage ditch. Check dams reduce scour and provide runoff treatment by reducing flow velocity and encouraging sediment deposition. Fiber rolls can be used in low flow and low gradient channels and have the advantage of decomposing naturally so removal is not required. They must be securely anchored and keyed-in at least one-third of their diameter. Fiber rolls may be stacked, provided the anchorage is secure, typically stacks should not exceed three rows high.

## Appropriate Applications

- The check dams described in this fact sheet are intended for low to moderate flow channels. Grade control in larger conveyances requires more detailed design beyond the scope of this fact sheet.
- Check dams may be installed in the following:
  - In small open channels that drain 10 acres or less.
  - In steep channels where storm water runoff velocities exceed 3 ft/s.
  - During the establishment of grass linings in drainage ditches or channels.
  - In temporary ditches where the short length of service does not warrant establishment of erosion-resistant linings.
- Fiber rolls are appropriate for low flow channels, with gravel bags being more appropriate in moderate flow channels.
- This BMP may be implemented on a project-by-project basis with other BMPs.



- Limitations**
- Not to be used in live streams.
  - Not appropriate in channels that drain areas greater than 10 acres.
  - Not to be placed in channels that are already grass lined unless erosion is expected, as installation may damage vegetation.
  - Can require extensive maintenance following high velocity flows.
  - Promotes sediment trapping which can be re-suspended during subsequent storms or removal of the check dam.
  - Not to be constructed from a silt fence.

- Standards and Specifications**
- Check dams shall be placed at a distance and height to allow small pools to form behind them. Install the first check dam approximately 16 ft. from the outfall device and at regular intervals based on slope gradient and soil type.
  - Install the first check dam approximately 16 ft. from the outfall device and at regular intervals based on slope gradient and soil type. Steeper slopes and more erosive soils (e.g. loose sand or silt) will require shorter spacing between check dams.
  - For multiple check dam installation, backwater from downstream check dam shall reach the toe of the upstream dam.
  - High flows (typically a 2-year storm or larger) shall safely flow over the check dam without an increase in upstream flooding or damage to the check dam.
  - Where grass is used to line ditches, check dams shall be removed when grass has matured sufficiently to protect the ditch or swale. Fiber roll or other degradable check dams may be left in place to minimize disturbance to the channel if appropriate.
  - Rock shall be placed individually by hand or by mechanical methods (no dumping of rock) to achieve complete ditch or swale coverage.

Gravel bags may be used as check dams with the following specifications. See details at the end of this fact sheet for additional information.

#### **Materials**

- **Bag Material:** Bags shall be either polypropylene, polyethylene or polyamide woven fabric or burlap, minimum unit weight 4 ounces/yd<sup>2</sup>, Mullen burst strength exceeding 300 psi in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70 percent in conformance with the requirements in ASTM designation D4355.

Adapted from Caltrans Construction Site BMPs

- **Bag Size:** Each gravel-filled bag shall have a length of 18 in., width of 12 in., thickness of 3 in., and mass of approximately 33 lb. Bag dimensions are nominal, and may vary based on locally available materials.
- **Fill Material:** Fill material shall be between one half to one-inch, washed, well graded, gravel or crushed rock with less than five percent fines such as Class 150 Riprap Bedding.

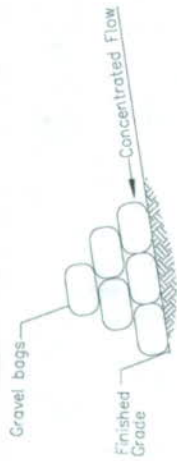
## **Installation**

- Install along a level contour.
- Tightly abut bags and stack according to detail shown in figure. Gravel bags shall not be stacked any higher than 3 ft.
- For permanent or long-term rock check dams, installations (over one year), key stone into the channel banks and extend it beyond the abutments a minimum of 18 in. to prevent flow around the dam.

## **Maintenance and Inspection**

- Inspect check dams after each significant rainfall event. Repair damage as needed.
- Remove sediments when depth reaches 50% of the check dam height and dispose of Standard Specification Section 107.
- Remove accumulated sediment prior to permanent seeding or soil stabilization and dispose of per Standard Specification Section 107.
- Remove check dam and accumulated sediment when check dams are no longer needed.
- Removed sediment shall be incorporated in the project at locations designated by the Engineer or disposed of outside the highway right-of-way in conformance with the Standard Specifications section 107.



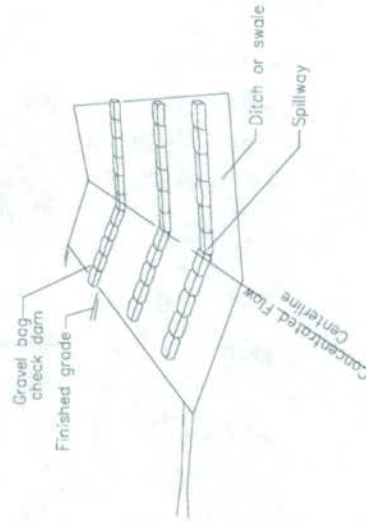


SECTION

TEMPORARY CHECK DAM (TYPE 2)

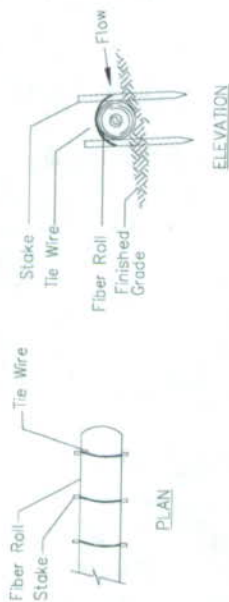
NOTE

Spillway depth "a" shall be maintained by removing accumulated sediment.



PERSPECTIVE

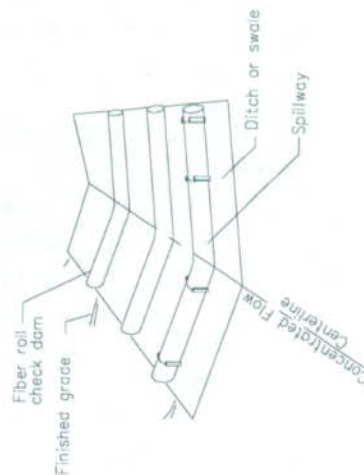
TEMPORARY CHECK DAM (TYPE II)



PLAN

ELEVATION

STACKING AND LASHING DETAIL



PERSPECTIVE

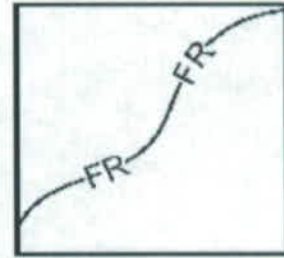
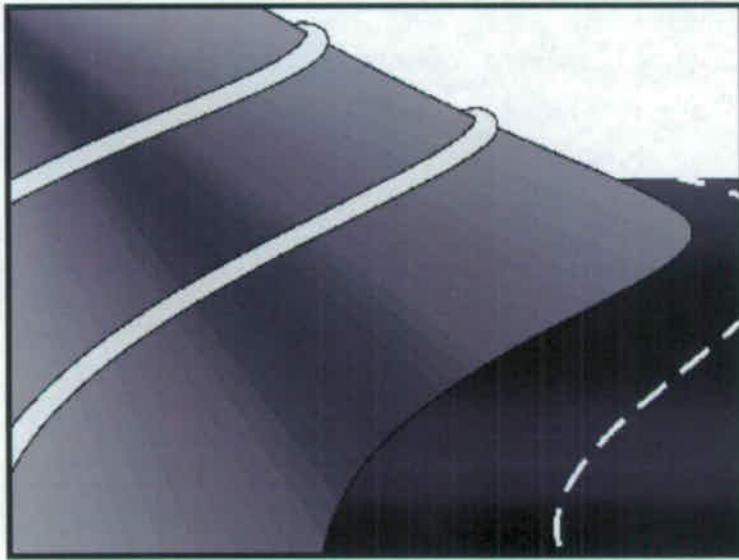
TEMPORARY CHECK DAM (TYPE I)

NOTE:  
KEY-IN 1/3 DIAMETER  
OF FIBER ROLL INTO  
THE GROUND.

# Fiber Rolls

**SC-5**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

### Definition and Purpose

A fiber roll consists of wood excelsior, rice, or wheat straw, or coconut fibers that are rolled or bound into a tight tubular roll and placed on the toe and face of slopes to intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff.

### Appropriate Applications

- Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.
- Below the toe of exposed and erodible slopes.
- Fiber rolls may be used as check dams in unlined ditches if approved by the individual responsible for the implementation of the SWPPP.
- Down-slope of exposed soil areas.
- Around temporary stockpiles.
- This BMP may be implemented on a project-by-project basis with other BMPs.
- Fiber rolls may also be used for inlet protection.

### Limitations

- Runoff and erosion may occur if fiber roll is not adequately trenched in.
- Fiber rolls at the toe of slopes greater than 2:1 shall be a minimum of 20-in. diameter or installations achieving the same protection (i.e. stacked at smaller diameter fiber rolls, etc.).
- Fiber rolls placed on paved surfaces for inlet protection must be weighted down to prevent sediment from passing beneath the roll.



- On soil, fiber rolls must be keyed in a minimum of one-third their diameter and securely anchored to be effective.
- Difficult to move once saturated.
- Fiber rolls could be transported by high flows if not properly trenched in.
- Fiber rolls have limited sediment capture zone.
- Do not use fiber rolls on slopes subject to creep, slumping, or landslide.

**Standards and Specifications*****Fiber Roll Materials***

- Fiber rolls shall be either:
  - Prefabricated rolls; or,
  - Rolled tubes of erosion control blanket.

***Assembly of Field Rolled Fiber Roll***

- Roll length of erosion control blanket into a tube of minimum 8 in. diameter.
- Bind roll at each end and every 4 ft. along length of roll with jute-type twine.

***Installation***

- Slope inclination of 4:1 or flatter: fiber rolls shall be placed on slopes 20 ft. apart.
- Slope inclination of 4:1 to 1:2: fiber rolls shall be placed on slopes 15 ft. apart.
- Slope inclination 2:1 or greater: fiber rolls shall be placed on slopes 10 ft. apart.
- Key -in fiber rolls into the ground a minimum of one-third their diameter.
- Anchor fiber rolls with stakes at the ends and spaced 4 ft. maximum on center.
- Use wood stakes with a nominal classification of 3/4 by 3/4 in., and minimum length of 24 in.
- If more than one fiber roll is placed in a row, the rolls shall be overlapped, not abutted.

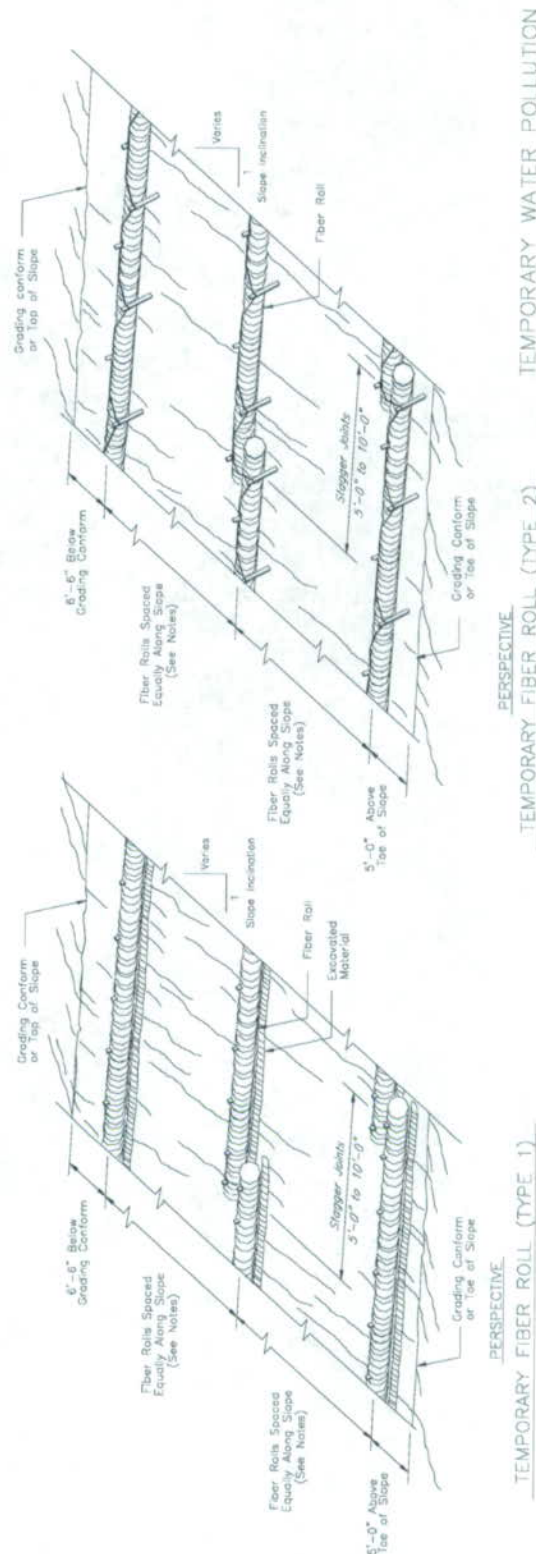
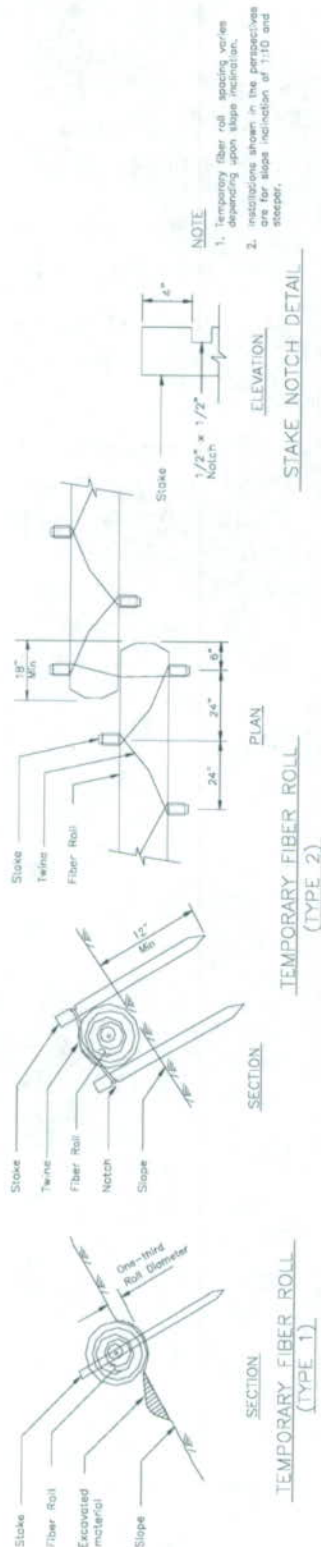
## **Removal**

- Fiber rolls are typically left in place.
- If fiber rolls are removed, collect and dispose of sediment accumulation, and fill and compact holes, trenches, depressions or any other ground disturbance to blend with adjacent ground.

## **Maintenance and Inspection**

- Repair or replace split, torn, unraveling, or slumping fiber rolls.
- Inspect fiber rolls when rain is forecast, following rainfall events and at least daily during prolonged rainfall. Perform maintenance as needed or as required to comply with the SWPPP.
- Maintain fiber rolls to provide an adequate sediment holding capacity. Sediment shall be removed when the sediment accumulation reaches three quarters (3/4) of the barrier height. Removed sediment shall be incorporated in the project or disposed of outside the highway Right-of-Way in conformance with the Standard Specifications Section 107.

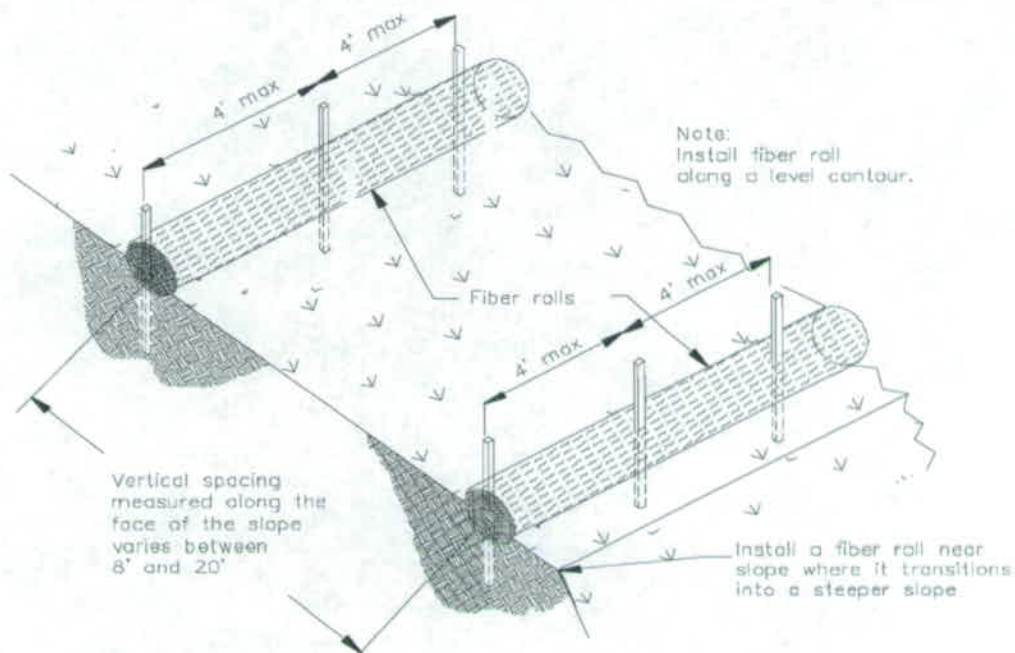




# Fiber Rolls

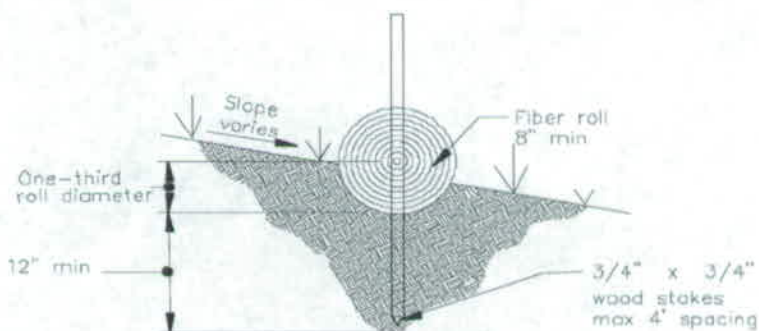
**SC-5**

Adapted from Caltrans Construction Site BMPs



**TYPE 1 FIBER ROLL INSTALLATION**

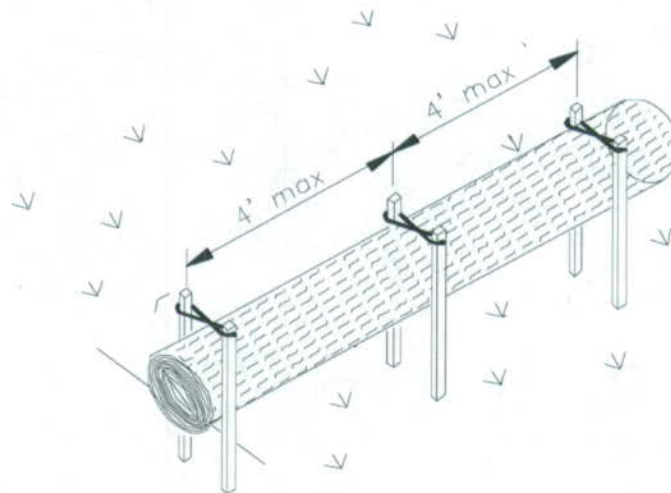
N.T.S.



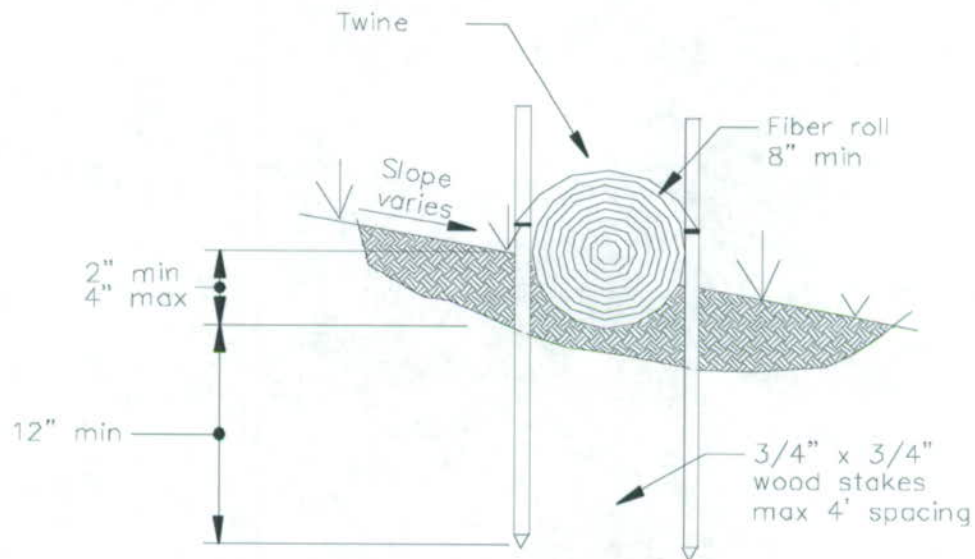
**ENTRENCHMENT DETAIL**

N.T.S.





TYPE 2 FIBER ROLL INSTALLATION  
N.T.S.

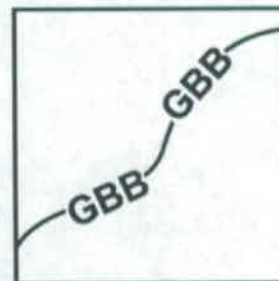
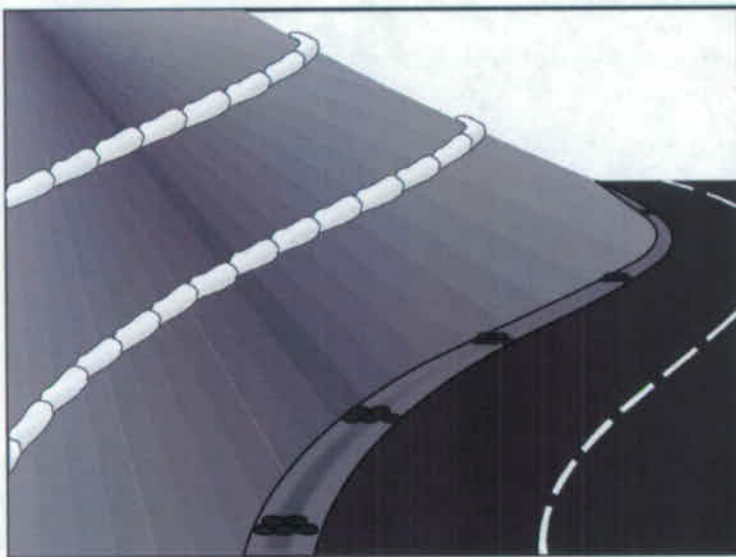


OPTIONAL ENTRENCHMENT DETAIL  
N.T.S.

# Gravel Bag Berm

SC-6

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

## Definition and Purpose

A gravel bag berm consists of a single row of gravel bags that are installed end-to-end to form a barrier across a slope to intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide some sediment removal. Gravel bags can also be used where flows are moderately concentrated, such as ditches, swales, and storm drain inlets (see BMP SC-08, Storm Drain Inlet Protection) to divert and/or detain flows.

## Appropriate Applications

- Along the perimeter of a site.
- Along streams and channels.
- Below the toe of exposed and erodible slopes.
- Down slope of exposed soil areas.
- Around stockpiles.
- Where flows are moderately concentrated, such as ditches, swales, and storm drain inlets.
- Across channels in constructing check dams or diversions.
- Parallel to a roadway to keep sediment off paved areas.
- At the top of slopes to divert runoff away from disturbed slopes.
- To divert or direct flow or create a temporary sediment basin.
- During construction activities in channels when the contributing drainage area is less than 10 acres.
- When conditions require a more durable product than silt fence, assuming that the bag material conforms to the requirements below and burlap is not used.



- Limitations
- When site conditions or construction sequencing require adjustments or relocation of the barrier to meet changing field conditions and needs during construction.
  - At grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.
  - Degraded gravel bags may rupture when removed, spilling contents.
  - Installation can be labor intensive.
  - Burlap bags have limited durability for long-term projects. .
  - When used to detain concentrated flows, maintenance requirements increase.

Standards and  
Specifications

**Materials**

- *Bag Material:* Bags shall be woven polypropylene, polyethylene or polyamide fabric or burlap, minimum unit weight 4 ounces/yd<sup>2</sup>, Mullen burst strength exceeding 300 psi in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70 percent in conformance with the requirements in ASTM designation D4355.
- *Bag Size:* Each gravel-filled bag shall have a length of 18 in., width of 12 in., thickness of 3 in., and mass of approximately 33 lb. Bag dimensions are nominal, and may vary based on locally available materials.
- *Fill Material:* Fill material shall be one-half to one-inch washed, well graded, gravel or crushed rock with less than five percent fines, such as Class 150 Riprap Bedding.

**Installation**

- When used as a linear control for sediment removal:
  - Install along a level contour.
  - Turn ends of gravel bag row up slope to prevent flow around the ends.
  - Generally, gravel bag barriers shall be used in conjunction with temporary soil stabilization controls up slope to provide effective control.
- When used for concentrated flows:
  - Stack gravel bags to a maximum height of 3 ft. and maximum side slopes of 1:1, using a pyramid approach.

# Gravel Bag Berm

**SC-6**

Adapted from Caltrans Construction Site BMPs

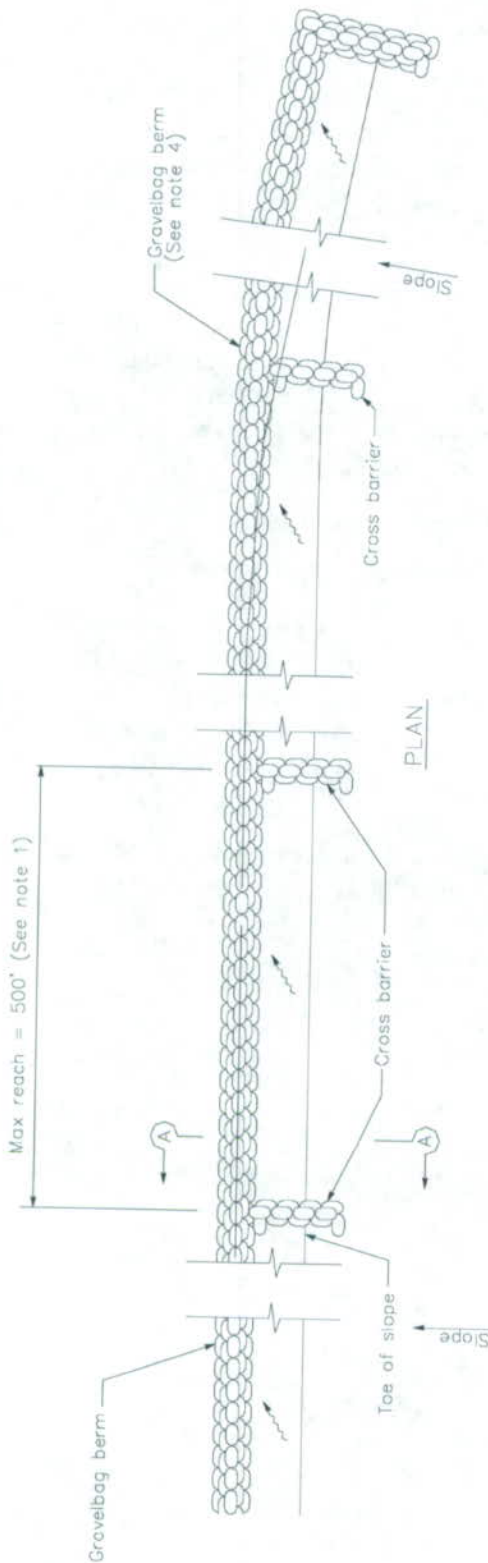
- Upper rows of gravel bags shall overlap joints in lower rows.

- Construct gravel bag barriers with a setback of at least 3 ft. from the toe of a slope. Where it is not practical due to specific site conditions, the gravel bag barrier may be constructed at the toe of the slope, but shall be constructed as far from the toe of the slope as practical to allow for maintenance access.
- Trenching or keying-in of bags is generally not necessary since the bags are heavy and flexible enough to prevent underflow. Bags should be placed on a stable surface with complete ground contact.

## Maintenance and Inspection

- Inspect gravel bag berms before and after each rainfall event, and weekly throughout the rainy season.
- Reshape or replace gravel bags as needed.
- Repair washouts or other damages as needed.
- Inspect gravel bag berms for sediment accumulations and remove sediments when accumulation reaches one-third of the berm height. Removed sediment shall be incorporated in the project at locations designated by the RE or disposed of outside the highway Right-of-Way in conformance with the Standard Specifications Section 107.
- Remove gravel bag berms when no longer needed. Remove sediment accumulation, and clean, re-grade, and stabilize the area.





GRAVELBAG BERM

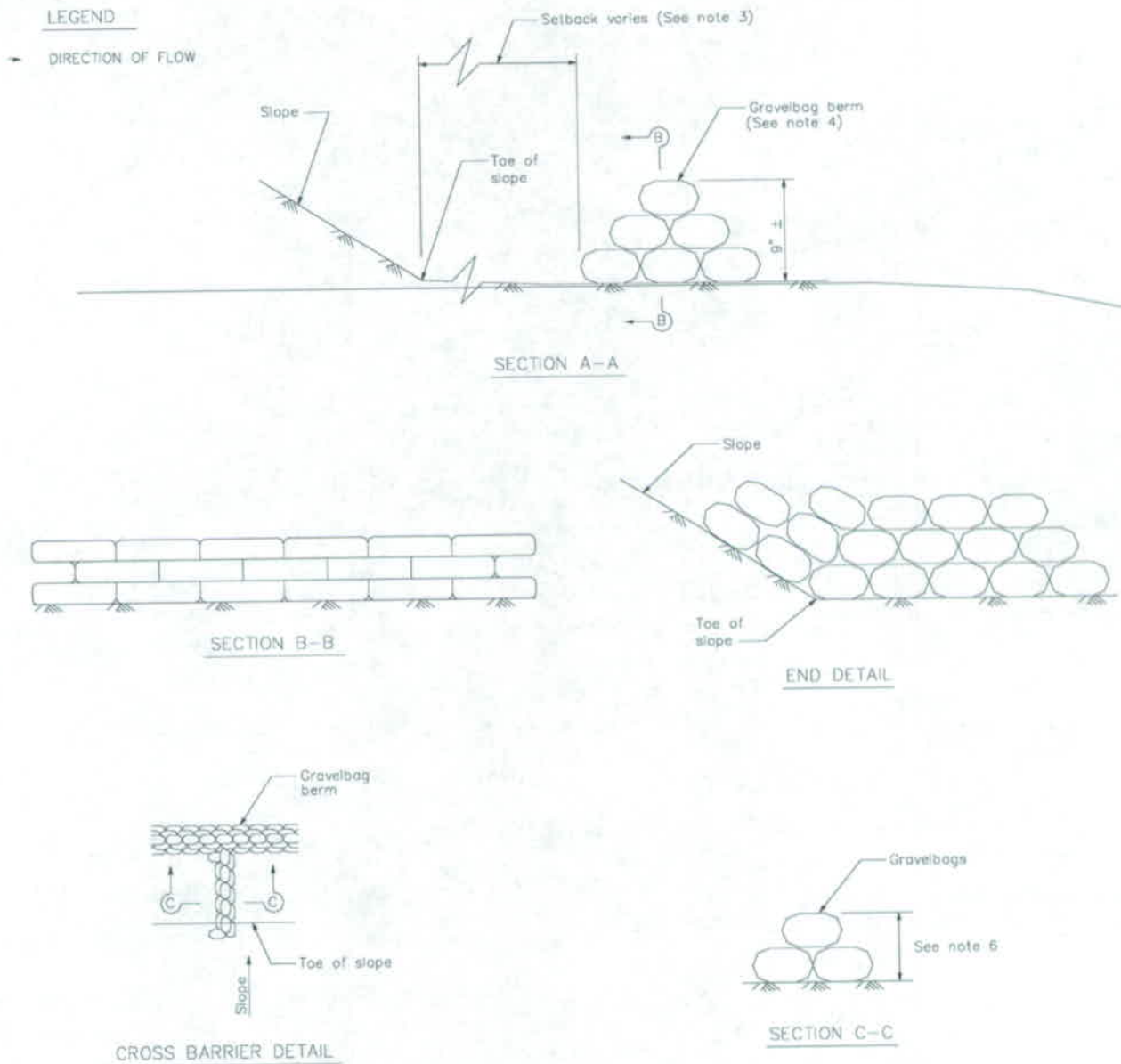
NOTES

1. Construct the length of each reach so that the change in base elevation along the reach does not exceed  $1/2$  the height of the linear barrier. In no case shall the reach length exceed 500'.
2. Place gravelbags tightly.
3. Dimension may vary to fit field condition.
4. Gravelbag barrier shall be a minimum of 3 bags high.
5. The end of the barrier shall be turned up slope.
6. Cross barriers shall be a min of  $1/2$  and a max of  $2/3$  the height of the linear barrier.
7. Gravelbag rows and layers shall be staggered to eliminate gaps.

# Gravel Bag Berm

**SC-6**

Adapted from Caltrans Construction Site BMPs

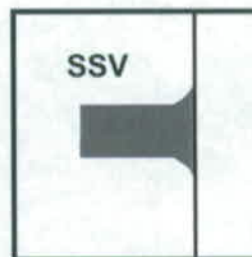




# Street Sweeping and Vacuuming

**SC-7**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

**Definition and Purpose** Practices to remove tracked sediment to prevent the sediment from entering a storm drain or watercourse.

**Appropriate Applications** These practices are implemented anywhere sediment is tracked from the project site onto public or private paved roads, typically at points of egress.

**Limitations** Sweeping and vacuuming may not be effective when soil is too wet or muddy however the soil should be moist to avoid dust.

**Standards and Specifications**

- Mechanical sweeping and washing with water require capture and treatment or proper disposal of any runoff.
- Inspect potential sediment tracking locations daily.
- Visible sediment tracking shall be swept per Standard Specification Section 107, or vacuumed to prevent excessive dust on a daily basis.

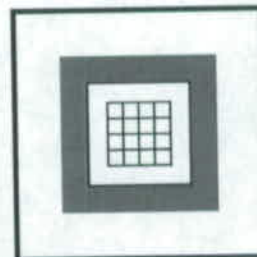
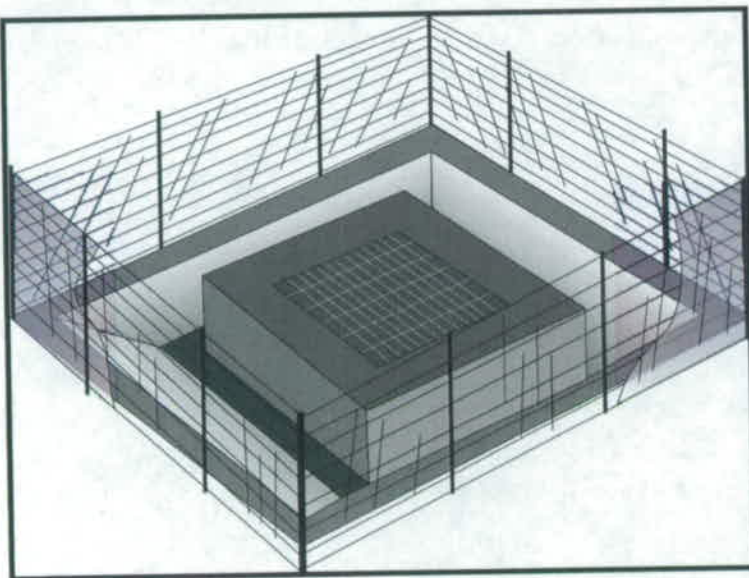
**Maintenance and Inspection**

- Inspect ingress/egress access points daily and clean track out areas in accordance with Standard Specifications Section 107.
- Be careful not to sweep up any unknown substance or any object that may be potentially hazardous.
- Adjust brooms frequently to maintain proper contact with the ground and maximize efficiency of sweeping operations.
- After sweeping is finished, properly dispose of sweeper wastes in conformance with the provisions in Standard Specifications Section 107.

# Storm Drain Inlet Protection

**SC-8**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

## Definition and Purpose

Devices used at storm drain inlets that are subject to runoff from construction activities to allow sediment to settle and/or to filter sediment prior to discharge into storm water drainage systems or watercourses.

## Appropriate Applications

- Where ponding will not encroach into highway traffic or adjacent property owners.
- Where sediment laden surface runoff may enter an inlet.
- Where disturbed drainage areas have not yet been permanently stabilized.
- Where the drainage area is 1 acre or less.

## Limitations

- Requires an adequate area to place materials and for water to pond without encroaching upon the traveled portion of the highway.
- Shoulders and paved portions of active highways utilizing inlet protection structures must be thoroughly closed off from traffic to prevent vehicle accidents.
- May require other temporary BMPs in combination to prevent sediment-laden storm water and non-storm water discharges to enter the storm drain system.
- Sediment removal may be difficult in high flow conditions or if runoff is heavily sediment laden. If high flow conditions are expected, use other on-site sediment trapping techniques (i.e. check dams) in conjunction with inlet protection.
- Frequent maintenance is required.



- For drainage areas larger than 1 acre, runoff shall be routed to a sediment-trapping device designed for larger flows. See BMPs SC-2, "Sediment/Desilting Basin", and SC-3 "Sediment Traps".
- Filter fabric fence inlet protection appropriate in open areas is subject to sheet flow and for flows not exceeding 0.5 ft<sup>3</sup>/s.
- Gravel bag barriers for inlet protection are applicable when sheet flows or concentrated flows exceed 0.5 ft<sup>3</sup>/s, and it is necessary to allow for overtopping to prevent flooding.
- Fiber rolls and foam barriers are not appropriate for locations where they cannot be properly anchored to the surface.
- Excavated drop inlet sediment traps are appropriate where relatively heavy flows are expected and overflow capability is needed.

## Standards and Specifications

Identify existing and/or planned storm drain inlets that have the potential to receive sediment-laden surface runoff. Determine if storm drain inlet protection is needed, and which method to use.

## Methods and Installation

- **DI Protection Type 1 - Filter Fabric Fence** - The silt fence fabric (Type 1) protection is illustrated on Page 5. Similar to constructing a silt fence. See BMP SC-1, "Silt Fence". Do not place filter fabric underneath the inlet grate since the collected sediment may fall into the drain inlet when the fabric is removed or replaced. This protection will only work if the inlet is surrounded by unpaved surface (e.g. when the road has not been built yet).
- **DI Protection Type 2 - Excavated Drop Inlet Sediment Trap** - The excavated drop inlet sediment trap (Type 2) is illustrated in Page 6. Similar to constructing a temporary silt fence, See BMP SC-1, "Silt Fence". Size excavated trap to provide a minimum storage capacity calculated at the rate of 67 yd<sup>3</sup>/acre of drainage area. This protection will only work if the inlet is surrounded by unpaved surface (e.g. when the road has not been built yet).
- **DI Protection Type 3 - Gravel Bag Barrier** - The gravel bag barrier (Type 3) is illustrated in Page 7. Flow from a severe storm shall not overtop the curb. In areas of high clay and silts, wrap or line the gravel bag structure with silt fence fabric and then cover with gravel to create additional filtering. Construct gravel bags in accordance with BMP SC-6, "Gravel Bag Berm". Gravel bags shall be used due to their high permeability.

# Storm Drain Inlet Protection

**SC-8**

Adapted from Caltrans Construction Site BMPs

- **DI Protection Type 4 – Foam Barriers and Fiber Rolls** – Foam barrier or fiber roll (Type 4) is placed around the inlet and keyed and anchored to the surface. Foam barriers and fiber rolls are intended for use as inlet protection where the area around the inlet is unpaved and the foam barrier or fiber roll can be secured to the surface. RE or construction NPDES Coordinator approval is required.
- Many proprietary devices and products are available for drain inlet protection and are listed in NDOT's qualified products list (QPL). If used, these products should be installed and maintained per the manufacturer's recommendations.

## Maintenance and Inspection

### General

- Inspect all inlet protection devices before and after every rainfall event and weekly during the rest of the rainy season. During extended rainfall events, inspect inlet protection devices at least once every 24 hours.
- Inspect the storm drain inlet after severe storms in the rainy season to check for bypassed material.
- Remove all inlet protection devices within thirty days after the site is stabilized, or when the inlet protection is no longer needed.
  - Bring the disturbed area to final grade and smooth and compact it. Appropriately stabilize all bare areas around the inlet.

### Requirements by Method

#### ■ **Type 1 - Silt Fence Fabric**

- This method shall be used for drain inlets requiring protection in areas where finished grade is established and erosion control seeding has been applied or is pending
- Make sure the stakes are securely driven in the ground and are in good shape (i.e., not bent, cracked, or splintered, and are reasonably perpendicular to the ground). Replace damaged stakes in accordance with SC-1 "Silt Fence" and Standard Specifications Section 637.
- Replace the fabric when the fabric becomes clogged with sediment. Make sure the fabric does not have any holes or tears. Repair or replace fabric as needed or
- At a minimum, remove the sediment behind the fabric fence when accumulation reaches one-third the height of the fence or



barrier height. Removed sediment shall be incorporated in the project or disposed of outside the highway Right-of-Way in conformance with the Standard Specifications Section 107.

■ ***Type 2 - Excavated Drop Inlet Sediment Trap***

- This method may be used for drain inlets requiring protection in areas that have been cleared and grubbed, and where exposed soil areas are subject to grading.
- Remove sediment from basin when the volume of the basin has been reduced by one-half.

■ ***Type 3 - Gravel Bag Barrier***

- This method may be used for drain inlets surrounded by AC or paved surfaces.
- Inspect bags for holes, gashes, and snags.
- Check gravel bags for proper arrangement and displacement. Remove sediment, manually or mechanically as appropriate, behind the barrier when it reaches one-third the height of the barrier. Removed sediment shall be incorporated in the project or disposed of outside the highway Right-of-Way in conformance with the Standard Specifications Section 107.

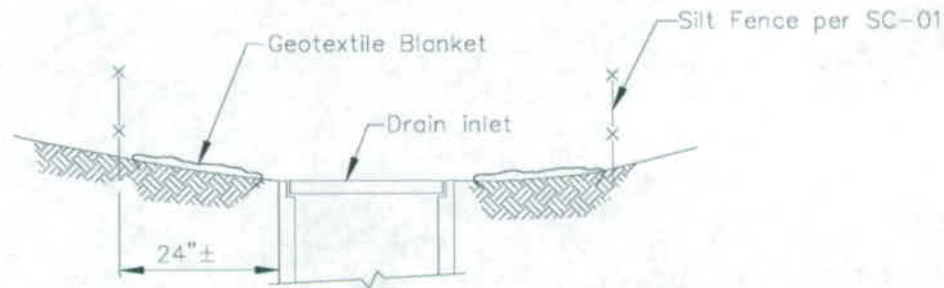
■ ***Type 4 - Foam Barrier and Fiber Rolls***

- This method may be used for drain inlets requiring protection in areas that have been cleared and grubbed, and where exposed soil areas are subject to grading.
- Check foam barrier or fiber roll for proper arrangement and displacement. Remove the sediment behind the barrier when it reaches one-third the height of the barrier. Removed sediment shall be incorporated in the project or disposed of outside the highway Right-of-way conformance with the Standard Specifications Section 107.

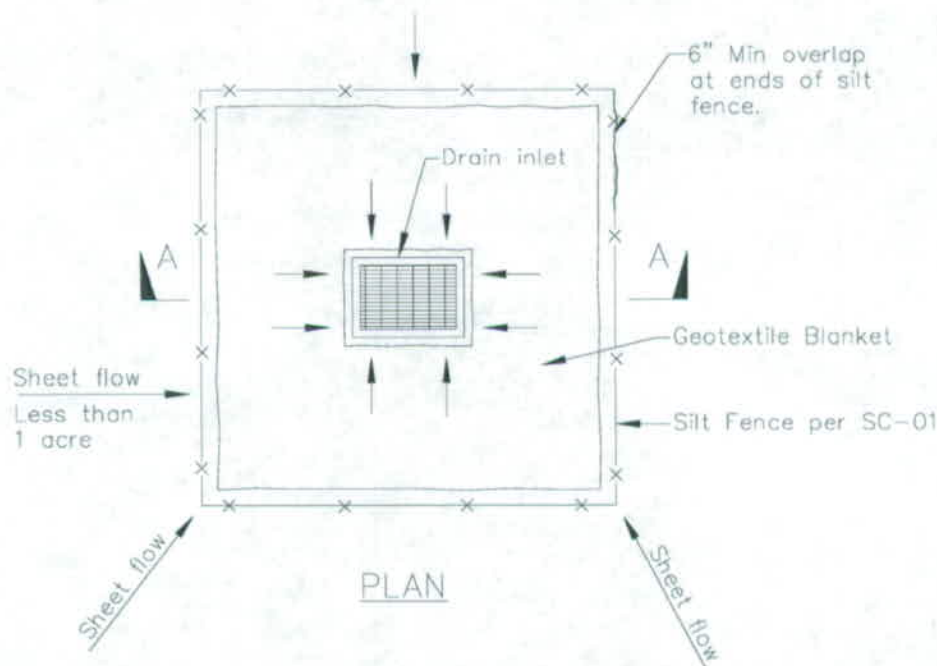
# Storm Drain Inlet Protection

**SC-8**

Adapted from Caltrans Construction Site BMPs



SECTION A-A



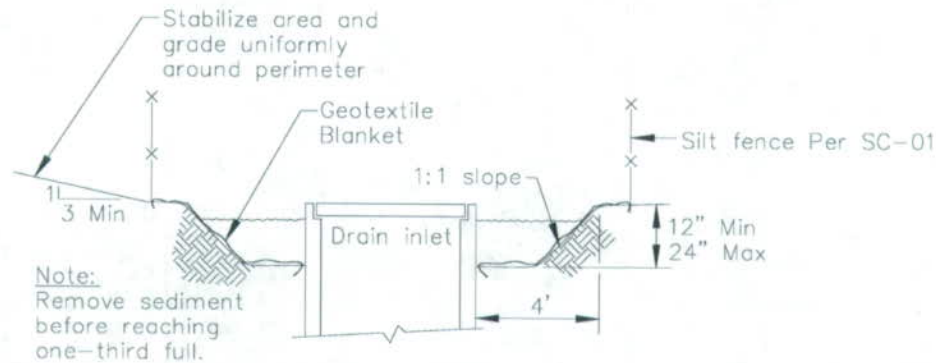
PLAN

DI PROTECTION TYPE 1  
NOT TO SCALE

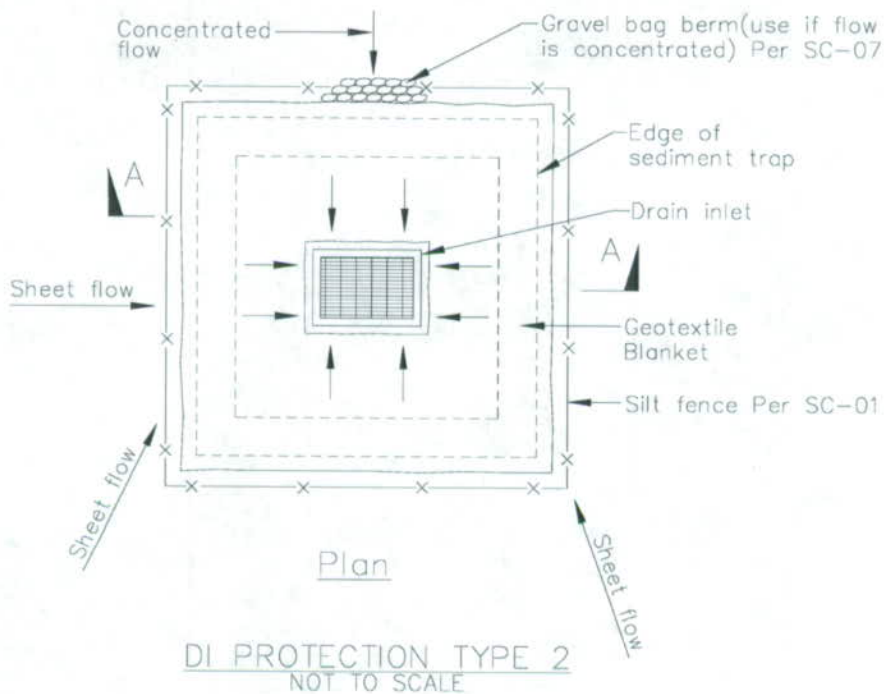
NOTES:

1. For use in areas where grading has been completed and final soil stabilization and seeding are pending.
2. Not applicable in paved areas.
3. Not applicable with concentrated flows.





Section A-A



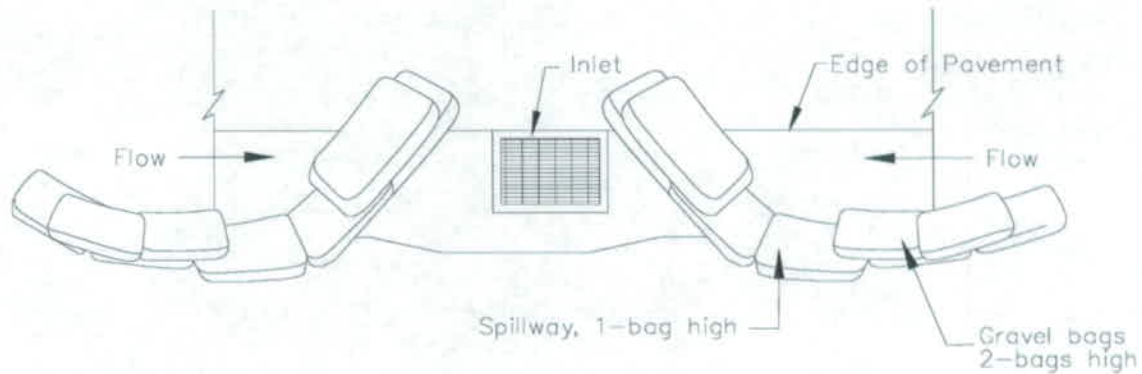
Notes

1. For use in cleared and grubbed and in graded areas.
2. Shape basin so that longest inflow area faces longest length of trap.
3. For concentrated flows, shape basin in 2:1 ratio with length oriented towards direction of flow.

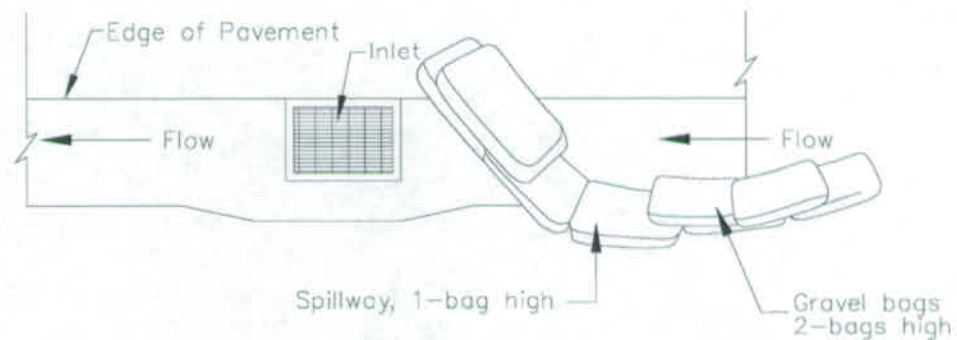
# Storm Drain Inlet Protection

SC-8

Adapted from Caltrans Construction Site BMPs



TYPICAL PROTECTION FOR INLET ON SUMP



TYPICAL PROTECTION FOR INLET ON GRADE

## NOTES:

1. Intended for short-term use.
2. Use to inhibit non-storm water flow.
3. Allow for proper maintenance and cleanup.
4. Bags must be removed after adjacent operation is completed.
5. Not applicable in areas with high silts and clays without filter fabric.



## Section 5

# Tracking Control

## Best Management Practices

### 5.1 Tracking Control

Tracking control consists of preventing or reducing off-site vehicle tracking from entering a storm drain or watercourse. Tracking control best management practices (BMPs) are shown in Table 5-1.

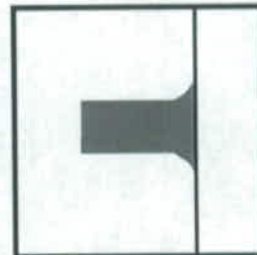
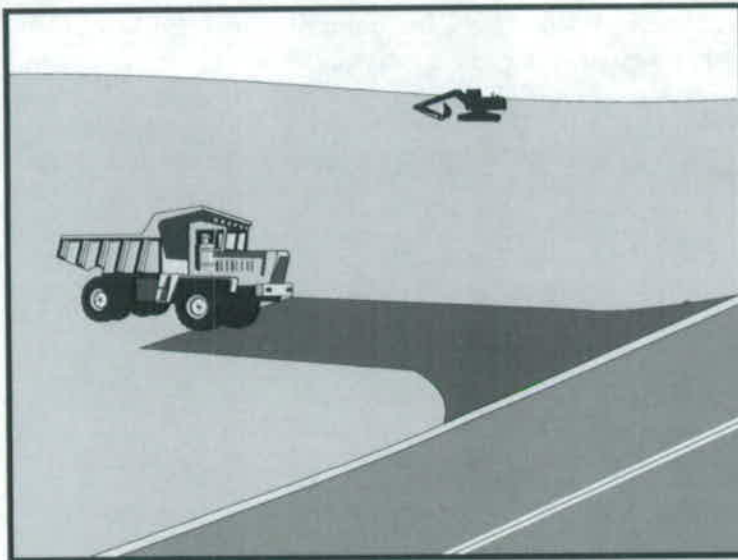
Table 5-1 TRACKING CONTROL BMPs	
ID	BMP NAME
TC-1	Stabilized Construction Entrance/Exit
TC-2	Stabilized Construction Roadway
TC-3	Entrance/Outlet Tire Wash

The remainder of this Section shows the working details for the tracking control BMPs.

# Stabilized Construction Approaches

**TC-1**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

**Definition and Purpose** A stabilized construction approach is defined by a construction site ingress/egress point that is stabilized to reduce the tracking of mud and dirt onto public roads by construction vehicles.

## Appropriate Applications

- Use at construction sites:
  - Where dirt or mud can be tracked onto public roads.
  - Adjacent to water bodies.
  - Where poor soils are encountered.
  - Where dust is a problem during dry weather conditions.
- This BMP may be implemented on a project-by-project basis in addition to other BMPs.

## Limitations

- Site conditions will dictate design and need.

## Standards and Specifications

- Minimize the points of ingress/egress to the construction site.
- Limit vehicle speeds to 15 mph on all unpaved routes and parking areas.
- Properly grade each construction ingress/egress to prevent runoff from flowing onto paved roads.
- Route runoff from stabilized ingress/egress points through a sediment-trapping device before discharge.
- Design stabilized ingress/egress points to support the heaviest vehicles and equipment that will use it.



# **TC-1 Stabilized Construction Entrance/Exit**

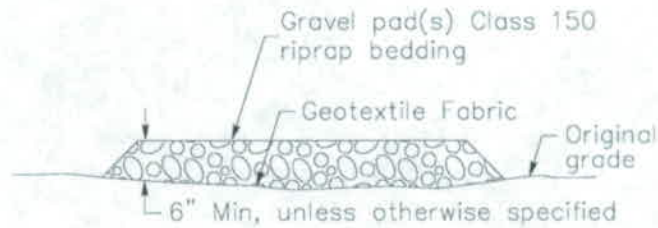
Adapted from Caltrans Construction Site BMPs

- Install gravel pad(s) consisting of 1 in. rough diameter, clean, well-graded gravel and crushed rock in conformance with Class 150 Riprap Bedding. Dimensions should be approximately 15 ft. wide by 6 inches deep, and 50 ft. long, or the length of the longest haul truck, whichever is greater. Re-screen, wash or apply additional rock in to maintain effectiveness.
  - Clearly designate combination or single purpose entrances and exits to the construction site. Require all employees, subcontractors and others to use them.
  - Implement BMP SC-7, "Street Sweeping and Vacuuming" as needed to maintain dust control and prevent sediment from leaving the site.
  - Maintain dust control during working hours and clean trackout from paved surfaces at the end of each work shift/day. Trackout must be cleaned daily, at minimum in conformance with Standard Specification 107.
  - Install wheel shakers consisting of constructed/manufactured steel plates with ribs in the event that trackout cannot be controlled with gravel pads. Ribbed or corrugated steel plates must be manufactured to support all expected loads.
  - Install wheel washers (TC-3) and maintain on a regular basis to maintain effectiveness in the event that trackout cannot be controlled with gravel pads and wheel shakers.
  - Clark County Health District "Dust Control Handbook" provides additional guidance for ribbed plate wheel shakers.
- Maintenance and Inspection
- Inspect routinely for damage and assess effectiveness of the BMP. Remove aggregate, separate and dispose of sediment if gravel is clogged with sediment or as directed by the RE.
  - Keep all temporary roadway ditches clear.
  - Inspect for damage and repair as needed.

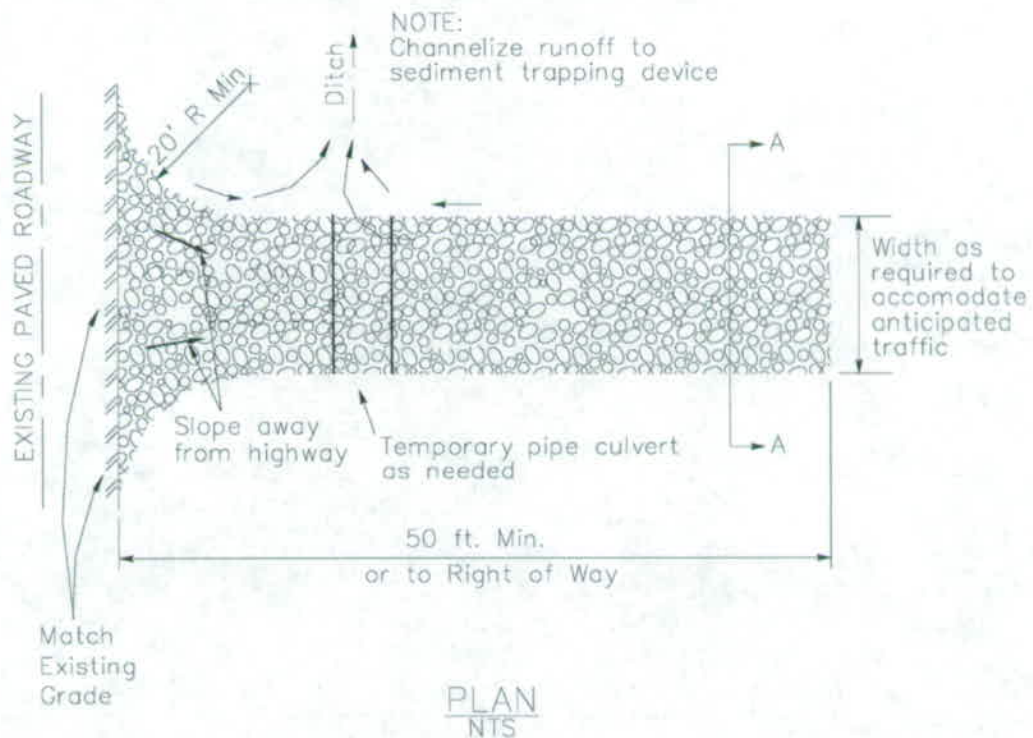
# Stabilized Construction Approaches

TC-1

Adapted from Caltrans Construction Site BMPs

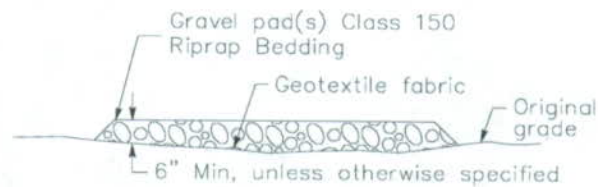


SECTION A-A  
NTS

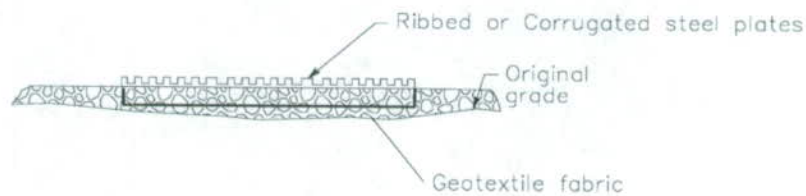


Stabilized Construction Approach



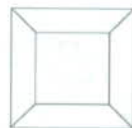


SECTION B-B  
NTS

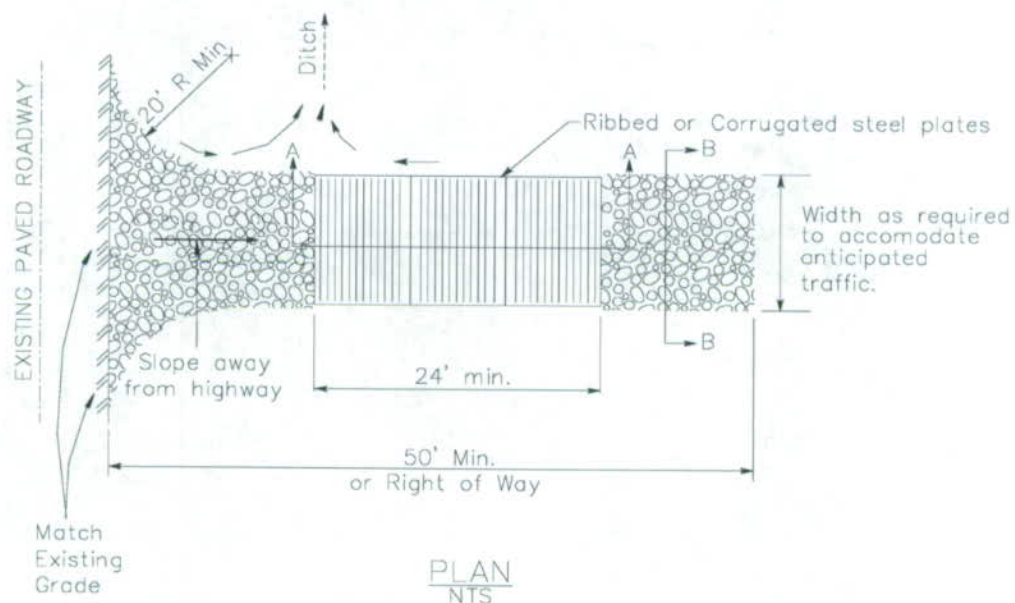


SECTION A-A  
NOT TO SCALE

NOTE:  
Channelize runoff to  
sediment trapping device



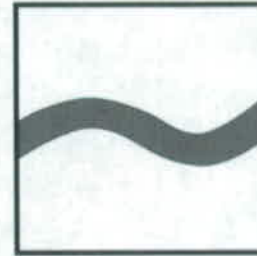
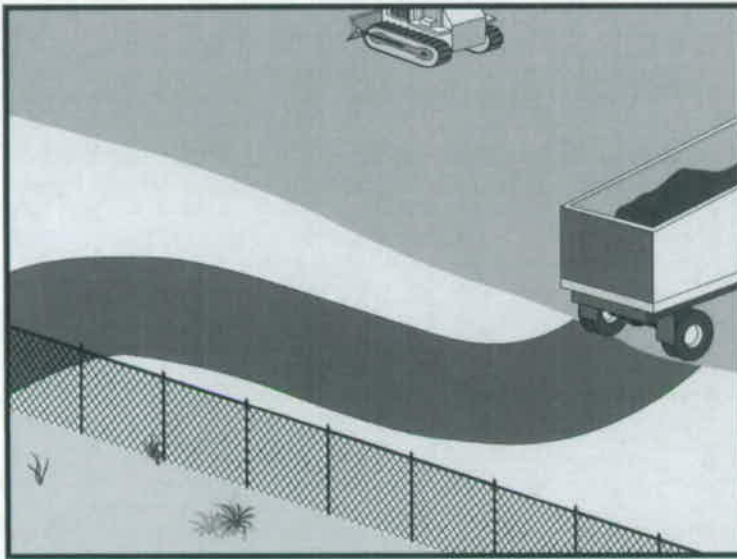
Sediment trapping  
device



# Stabilized Construction Roadway

TC-2

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

### Definition and Purpose

A stabilized construction roadway is a temporary access road or haul road. It is designed for the control of dust and erosion created by vehicular traffic. Construction roads with heavier traffic such as haul roads may require increased protection over smaller lateral roads such as employee parking.

### Appropriate Applications

- Construction roadways and short-term detour roads:
  - Where mud tracking is a problem during wet weather.
  - Where dust is a problem during dry weather.
  - Adjacent to water bodies.
  - Where silt or clay content is higher than 15%.
  - Where there are steep grades and additional traction is needed.

- This BMP may be implemented on a project-by-project basis with other BMPs.

### Limitations

- Materials will likely need to be removed prior to final project grading and stabilization.
- Site conditions will dictate design and need.

### Standards and Specifications

- Properly grade roadway to prevent runoff from leaving the construction site.
- Design stabilized construction roadways to support the heaviest vehicles and equipment that will use it.

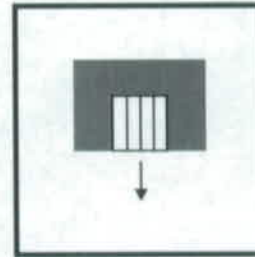
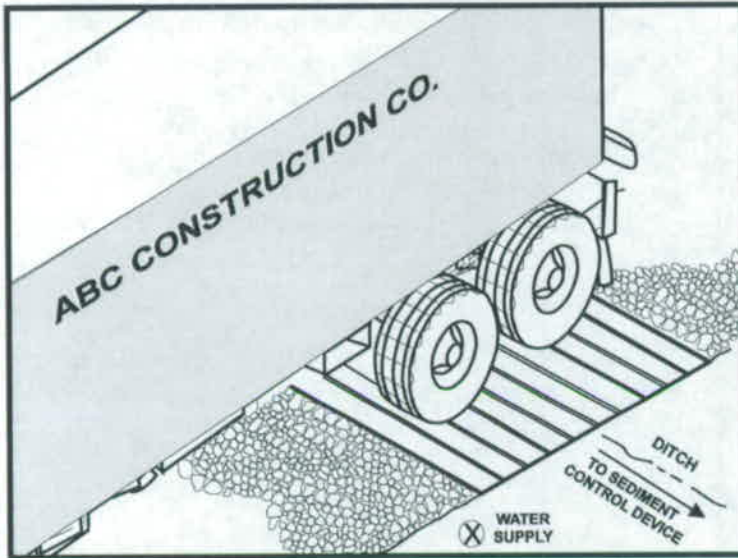


- Stabilize roadways using water, dust palliative, aggregate, asphalt concrete, or concrete; based on required longevity, performance, and site conditions and maintain in a stabilized condition.
  - Coordinate materials with those used for stabilized construction ingress/egress points (TC-2).
  - If aggregate is selected, use clean, well-graded gravel or crushed rock in conformance with Class 150 Riprap Base. Minimum dimensions should be approximately 15 feet wide by 6 inches deep or as needed to accommodate the types of vehicles that will use the road.
  - Limit vehicles speeds to 15 mph on all unpaved routes and parking areas.
  - The use of bumps or dips for speed control is encouraged.
  - Apply bituminous or concrete paving as soon as possible to all future permanent roadway or parking areas.
- Maintenance and Inspection
- Inspect routinely for damage and repair as needed, or as directed by the RE.
  - Keep all temporary roadway ditches clear.
  - When no longer required, remove stabilized construction roadway and re-grade and restore slopes to match site conditions.

# Entrance/Outlet Tire Wash

**TC-3**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

### Definition and Purpose

Tire wash stations can be located at stabilized construction egress points to remove sediment from tires and under-carriages, and to prevent sediment from being transported onto public roadways.

### Appropriate Applications

- Tire washes may be used on construction sites where dirt and mud tracking onto public roads by construction vehicles may occur.
- This BMP may be appropriate when stabilized ingress/egress points and construction roads are not sufficient in preventing sediment tracking onto adjacent roads or highways or in Environmentally Sensitive Areas (ESAs).
- Tire and vehicle washing may also be required to prevent the spread of noxious weeds. Refer to the contract documents to verify compliance with noxious weed requirements.

### Limitations

- Requires a supply of wash water. Potential sources include existing water service connections if available, fire hydrants, or temporary water storage tanks. The contractor shall verify that the use of any municipal or other existing water service is allowable with the appropriate agency.
- Requires a turnout or doublewide exit to avoid having entering vehicles drive through the wash area.

### Standards and Specifications

- This BMP should be used in combination with TC-1, "Stabilized Construction Entrance/Exit".
- Construct on level ground when possible, on a pad of coarse aggregate. A geotextile fabric shall be placed below the aggregate.
- The wash rack must be designed for anticipated traffic loads.



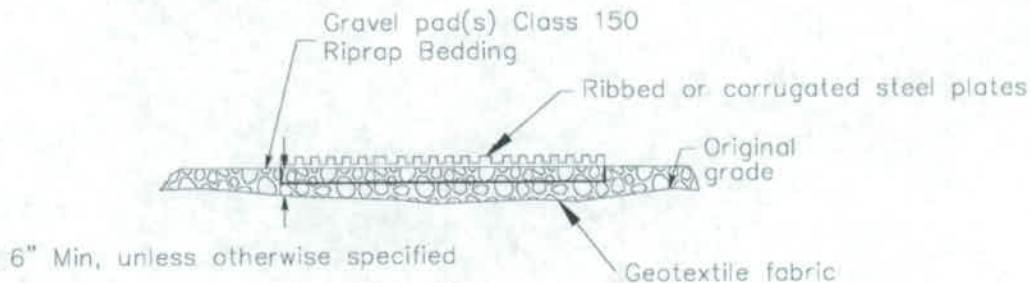
**Maintenance and  
Inspection**

- Provide a drainage ditch that will convey the runoff from the wash area to a sediment-trapping device. See SC-3 for additional guidance regarding sediment traps. The drainage ditch shall be of sufficient grade, width, and depth and adequately stabilized to safely carry the wash runoff.
- Require that all employees, subcontractors, and others use the wash facility as appropriate.
- Implement BMP SC-7, "Street Sweeping and Vacuuming" as needed.
- Remove accumulated sediment in wash rack and/or sediment trap to maintain system performance and dispose of in accordance with Standard Specifications Section 107.
- Inspect routinely for damage and repair as needed.

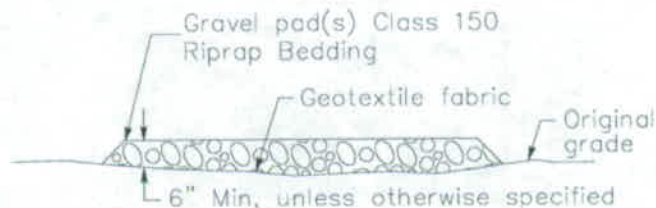
# Entrance/Outlet Tire Wash

TC-3

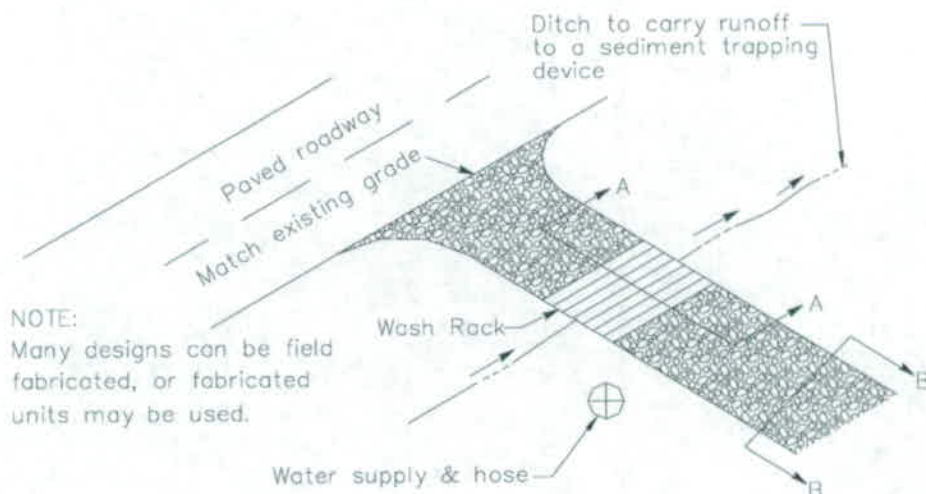
Adapted from Caltrans Construction Site BMPs



SECTION A-A  
NOT TO SCALE



SECTION B-B  
NTS



TYPICAL TIRE WASH  
NOT TO SCALE



## Section 6

# Non-Storm Water Management Best Management Practices

### 6.1 Definition

Non-storm water management best management practices (BMPs) are source control BMPs that prevent pollution by limiting or reducing potential pollutants at their source before they come in contact with storm water. These practices involve day-to-day operations of the construction site and are usually under the control of the Contractor. These BMPs are also referred to as "good housekeeping practices", which involve keeping a clean, orderly construction site.

Table 6-1 lists the non-storm water management BMPs. It is important to note that all these BMPs have been approved by NDOT for statewide use and they shall be implemented depending on the conditions/applicability of deployment described as part of the BMP.

Table 6-1 NON-STORM WATER MANAGEMENT BMPs	
ID	BMP NAME
NS-1	Water Conservation Practices
NS-2	Dewatering Operations
NS-3	Paving and Grinding Operations
NS-4	Temporary Stream Crossing
NS-5	Clear Water Diversion
NS-6	Illicit Connection/Illegal Discharge Detection and Reporting
NS-7	Potable Water/Irrigation
NS-8	Vehicle and Equipment Cleaning
NS-9	Vehicle and Equipment Fueling
NS-10	Vehicle and Equipment Maintenance
NS-11	Pile Driving and Drilling Operations
NS-12	Concrete and Pavement Curing
NS-13	Material and Equipment Use Over Water
NS-14	Concrete Finishing
NS-15	Structure Demolition/Removal Over or Adjacent to Water
NS-16	Temporary Batch Plants

### **6.1.1 Vehicle and Equipment Operations**

These are procedures and practices designed to minimize or eliminate the discharge of pollutants from vehicle and equipment cleaning, fueling and maintenance operations to storm water drainage systems or to watercourses. Vehicle and equipment operations include the following BMPs:

- Vehicle and Equipment Cleaning
- Vehicle and Equipment Fueling
- Vehicle and Equipment Maintenance

The remainder of this Section shows the working details for each of the non-storm water management BMPs.



# Water Conservation Practices

**NS-1**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

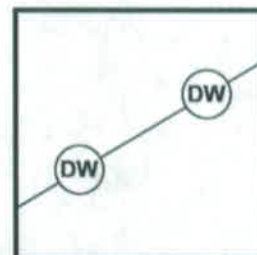
- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose	Water conservation practices are activities that use water during the construction of a project in a manner that avoids causing erosion and/or the transport of pollutants off site.
Appropriate Applications	<ul style="list-style-type: none"><li>■ Water conservation practices are implemented on all construction sites and wherever water is used.</li><li>■ Applies to all construction projects.</li><li>■ Washing of equipment may be required to reduce the spreading of invasive weeds and other species. Check Special Provisions for requirements.</li></ul>
Limitations	<ul style="list-style-type: none"><li>■ None identified.</li></ul>
Standards and Specifications	<ul style="list-style-type: none"><li>■ Keep water equipment in good working condition and repair water leaks promptly.</li><li>■ Stabilize water truck filling area.</li><li>■ Washing of vehicles and equipment on the construction site should be minimized or avoided if possible.</li><li>■ Avoid using water to clean construction areas. Do not use water to clean pavement. Paved areas shall be swept and/or vacuumed.</li><li>■ Apply water for dust control in accordance with the Standard Specifications Sections 107, 210.</li><li>■ Report unexpected discharges to the Engineer immediately.</li></ul>
Maintenance and Inspection	<ul style="list-style-type: none"><li>■ Inspect water equipment at least weekly and repair as needed.</li></ul>

# Dewatering Operations

NS-2

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

**Definition and Purpose** Dewatering Operations are practices that manage the discharge of pollutants when non-storm water and accumulated precipitation (storm water) must be removed from a work location so that construction work may be accomplished.

**Appropriate Applications** These practices are implemented for discharges of non-storm water and storm water (accumulated rain water) from construction sites. Non-storm waters include, but are not limited to, groundwater, water from cofferdams, de-watering of piles, water diversions, and waters used during construction activities that must be removed from a work area.

Practices identified in this section are also appropriate for implementation when managing the removal of accumulated precipitation (storm water) from depressed areas at a construction site. Storm water mixed with non-storm water should be managed as non-storm water.

- Limitations**
- Dewatering operations for non-storm water will require, and must comply with, applicable local permits, project-specific permits, and regulations.
  - Site conditions will dictate design and use of dewatering operations.
  - A dewatering plan shall be submitted as part of the SWPPP/WPCP detailing the location of dewatering activities and equipment, and discharge point.
  - The controls discussed in this BMP address sediment only. If the presence of polluted water with hazardous substances is identified in the contract, the contractor shall implement dewatering pollution controls as required by the contract documents. If the quality of water to be removed by dewatering is not identified as polluted in



the contract documents, but is later determined by observation or testing to be polluted, the contractor shall notify the Engineer and the Storm Water Quality Coordinator and comply with Standard Specifications Section 107.

#### **Standards and Specifications**

- Avoid dewatering discharges where possible by using the water for dust control, or by infiltration if appropriate.
- Dewatering for accumulated precipitation (storm water) shall follow this BMP and use treatment measures specified herein.
- NDEP may require a separate NPDES Dewatering Permit prior to the discharge of non-storm water. Dewatering Permits are classified as Temporary Discharge Permits and can take at least 2 weeks to be issued from the time that the permit application is submitted to NDEP. The application requires that the applicant provide owner and facility/site information, receiving water name, narrative description of the site and activities, water quality analysis, quantity of discharge, topographic and site maps, and existing environmental permits. The Dewatering Permit will have specific testing, monitoring, and discharge requirements.
- The discharge of accumulated precipitation (storm water) to a water body or storm drain is subject to the requirements of the General Permit. Sediment control and other appropriate BMPs must be employed when this water is discharged.
- The flow chart shown at the end of this BMP shall be utilized to guide dewatering operations.
- Discharges must comply with regional and watershed-specific discharge requirements.
- Additional permits or permissions from other agencies may be required for dewatering cofferdams or diversions.
- Dewatering discharges must not cause erosion at the discharge point.
- Dewatering records shall be maintained for a period of 3 years.

#### **Implementation    Sediment Treatment**

A variety of methods can be used to treat water during dewatering operations from the construction site. Several devices are presented in this section that provide options to achieve sediment removal. The size of particles present in the sediment and General Permit or receiving water limitations on sediment are key considerations for selecting sediment treatment option(s); in some cases, the use of multiple devices may be appropriate.

Tank size will depend on flow volume, constituents of concern, and residency period required. A qualified Professional Engineer is required to properly size and design dewatering equipment.

## **Category 1: Constructed Settling Technologies**

The devices discussed in this category are to be used exclusively for dewatering operations only.

### ***Sediment Basin***

#### ***Description:***

A sediment basin is a temporary basin with a controlled release structure that is formed by excavation and/or construction of an embankment to detain sediment-laden runoff and allow sediment to settle out before discharging (see SC - 2).

#### ***Appropriate Applications:***

Effective for the removal of trash, gravel, sand, and silt and some metals that settle out with the sediment.

#### ***Implementation:***

- Excavation and construction of related facilities is required.
- Temporary sediment basins must be fenced if safety is a concern.
- Outlet protection is required to prevent erosion at the outfall location.

#### ***Maintenance:***

- Maintenance is required for safety fencing, vegetation, embankment, inlet and outfall structures, as well as other features.
- Removal of sediment is required when the design capacity is reduced by 50%.

### ***Sediment Trap***

#### ***Description:***

A sediment trap is a temporary basin formed by excavation and/or construction of an earthen embankment across a waterway or low drainage area to detain sediment-laden runoff and allow sediment to settle out before discharging (see SC-3).

#### ***Appropriate Applications:***

Effective for the removal of large and medium sized particles (sand and gravel) and some metals that settle out with the sediment.

#### ***Implementation:***

- Excavation and construction of related facilities is required.



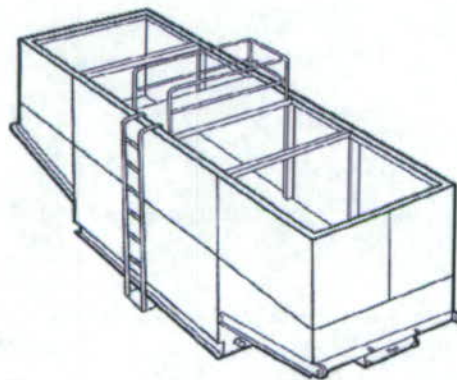
- Trap inlets shall be located to maximize the travel distance to the trap outlet.
- Use rock or vegetation to protect the trap outlets against erosion.

***Maintenance:***

- Maintenance is required for vegetation, embankment, inlet and outfall structures, as well as other features.
- Removal of sediment is required when the design capacity is reduced by 50%.

***Category 2: Mobile Settling Technologies***

The devices discussed in this category are typical of tanks that can be used for sediment treatment of dewatering operations. A variety of vendors are available who supply these tanks.

***Weir Tank******Description:***

A weir tank separates water and waste by using weirs. The configuration of the weirs (over and under weirs) maximizes the residence time in the tank and determines the waste to be removed from the water, such as oil, grease, and sediments.

***Appropriate Applications:***

The tank removes trash, some settleable solids (gravel, sand, and silt), some visible oil and grease, and some metals (removed with sediment). To achieve high levels of flow, multiple tanks can be used in parallel. If additional treatment is desired, the tanks can be placed in series or as pre-treatment for other methods.

***Implementation:***

- Tanks are delivered to the site by the vendor, who can provide assistance with set-up and operation.

Adapted from Caltrans Construction Site BMPs

- Tank size will depend on flow volume, constituents of concern, and residency period required. A qualified Professional Engineer is required to properly size and design weir tanks.

#### **Maintenance:**

- Periodic cleaning is required based on visual inspection or reduced flow.
- Oil and grease disposal must be by licensed waste disposal company.

#### **Dewatering Tank**



#### **Description:**

A dewatering tank removes debris and sediment. Flow enters the tank through the top, passes through a fabric filter, and is discharged through the bottom of the tank. The filter separates the solids from the liquids.

#### **Appropriate Applications:**

The tank removes trash, gravel, sand, and silt, some visible oil and grease, and some metals (removed with sediment). To achieve high levels of flow, multiple tanks can be used in parallel. If additional treatment is desired, the tanks can be placed in series or as pre-treatment for other methods.

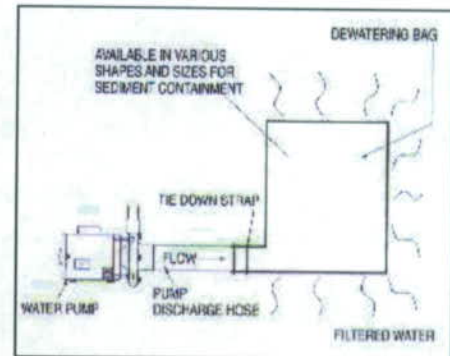
#### **Implementation:**

- Tanks are delivered to the site by the vendor, who can provide assistance with set-up and operation.
- Tank size will depend on flow volume, constituents of concern, and residency period required. A Professional Engineer is required to appropriately size tank.

#### **Maintenance:**

- Periodic cleaning is required based on visual inspection or reduced flow.
- Oil and grease disposal must be by licensed waste disposal company as per Standard Specifications Section 107.



Category 3: Basic Filtration Technologies**Gravity Bag Filter****Description:**

A gravity bag filter, also referred to as a dewatering bag, is a square or rectangular bag made of non-woven geotextile fabric that collects sand, silt, and fines.

**Appropriate Applications:**

Effective for the removal of sediments (gravel, sand, and silt). Some metals are removed with the sediment.

**Implementation:**

- Water is pumped into one side of the bag and seeps through the bottom and sides of the bag.
- A secondary barrier, such as a rock filter bed barrier, is placed beneath and beyond the edges of the bag to capture sediments that escape the bag.

**Maintenance:**

- Inspection of the flow conditions, bag condition, bag capacity, and the secondary barrier is required.
- Replace the bag when it no longer filters sediment or passes water at a reasonable rate.
- The bag is disposed off-site as per Standard Specifications Section 107.

## Category 4: Advanced Filtration Technologies

### *Sand Media Particulate Filter*



#### *Description:*

Water is treated by passing it through canisters filled with sand media. Generally, sand filters provide a final level of treatment. They are often used as a secondary or higher level of treatment after a significant amount of sediment and other pollutants have been removed.

#### *Appropriate Applications:*

Effective for the removal of trash, gravel, sand, and silt and some metals, as well as the reduction of biochemical oxygen demand (BOD) and turbidity.

Sand filters can be used for standalone treatment or in conjunction with bag and cartridge filtration if further treatment is required.

Sand filters can also be used to provide additional treatment to water treated via settling or basic filtration.

#### *Implementation:*

The filters require delivery to the site and initial set up. The vendor can provide assistance with installation and operation.

#### *Maintenance:*

The filters require monthly service to monitor and maintain the level the sand media.



## *Pressurized Bag Filter*



### *Description:*

A pressurized bag filter is a unit composed of single filter bags made from polyester felt material. The water filters through the unit and is discharged through a header, allowing for the discharge of flow in series to an additional treatment unit. Vendors provide pressurized bag filters in a variety of configurations. Some units include a combination of bag filters and cartridge filters for enhanced contaminant removal.

### *Appropriate Applications:*

Effective for the removal of sediment (sand and silt) and some metals, as well as the reduction of BOD, turbidity, and hydrocarbons. Oil absorbent bags are available for hydrocarbon removal.

Filters can be used to provide secondary treatment to water treated via settling or basic filtration.

### *Implementation:*

The filters require delivery to the site and initial set up. The vendor can provide assistance with installation and operation.

### *Maintenance:*

The filter bags require replacement when the pressure differential exceeds the manufacturer's recommendation.

Adapted from Caltrans Construction Site BMPs

## *Cartridge Filter*



### *Description:*

Cartridge filters provide a high degree of pollutant removal by utilizing a number of individual cartridges as part of a larger filtering unit. They are often used as a secondary or higher (polishing) level of treatment after a significant amount of sediment and other pollutants are removed. Units come with various cartridge configurations (for use in series with pressurized bag filters) or with a larger single cartridge filtration unit (with multiple filters within).

### *Appropriate Applications:*

Effective for the removal of sediment (sand, silt, and some clays) and metals, as well as the reduction of BOD, turbidity, and hydrocarbons. Hydrocarbons can effectively be removed with special resin cartridges. Filters can be used to provide secondary treatment to water treated via settling or basic filtration.

### *Implementation:*

The filters require delivery to the site and initial set up. The vendor can provide assistance.

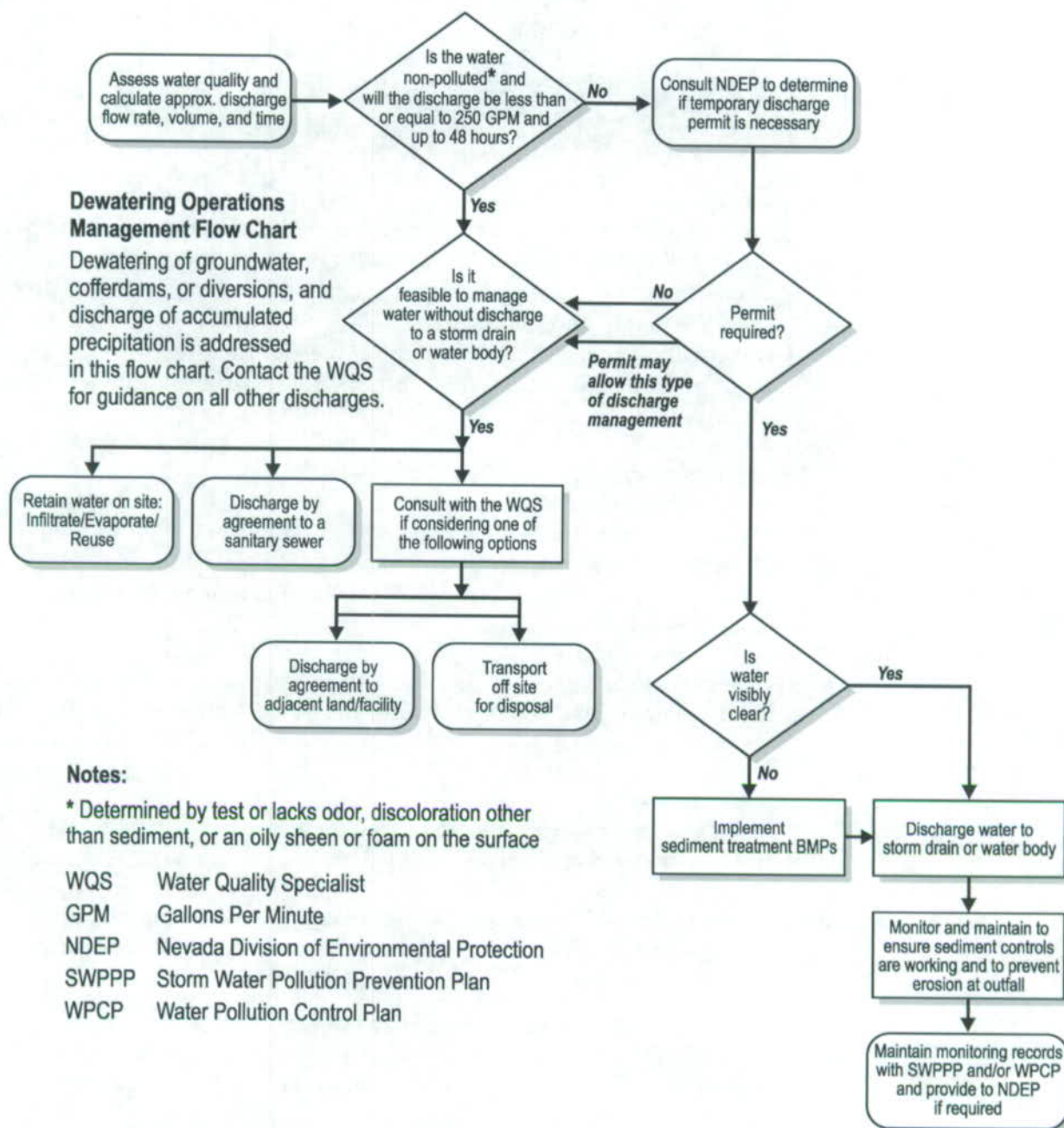
### *Maintenance:*

The cartridges require replacement when the pressure differential exceeds the manufacturer's recommendation.

### Maintenance and Inspection

- Inspect all BMPs implemented to comply with permit requirements frequently and repair or replace to ensure the BMPs function as designed.
- Accumulated sediment removed during the maintenance of a dewatering device may be either spread on site and stabilized or disposed of at a disposal site as approved by the Engineer.
- Accumulated sediment that is commingled with other pollutants must be disposed of in accordance with all applicable laws and regulations and as approved by the Engineer.

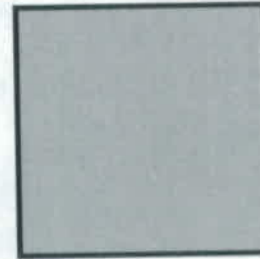
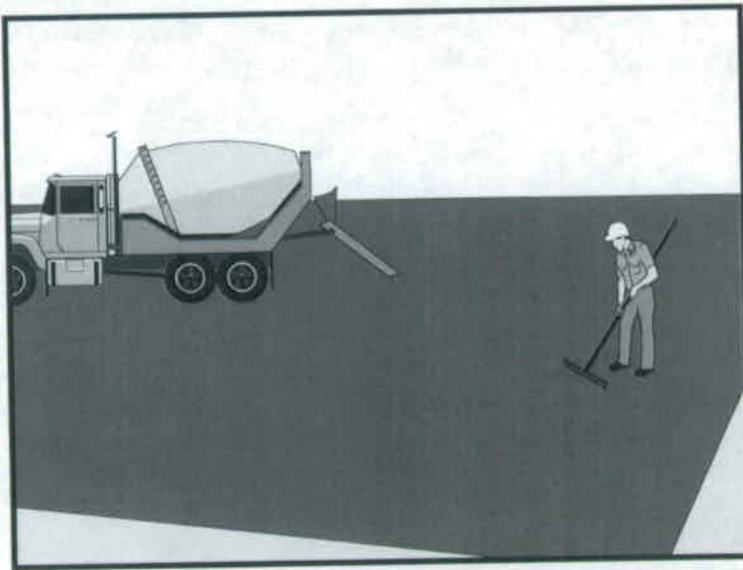




# Paving and Grinding Operations

**NS-3**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- ☐ Soil Stabilization
- ☒ Sediment Control
- ☐ Tracking Control
- ☐ Wind Erosion Control
- ☒ Non-Storm Water Management
- ☐ Materials and Waste Management

### Definition and Purpose

Paving, saw cutting, and grinding operations often involve the use of materials containing potentially harmful chemicals and can generate fine particles that should not be allowed to enter receiving waters. The procedures within this fact sheet are designed to minimize the transport of pollutants associated with these activities to the storm drain system or receiving water body.

### Appropriate Applications

These procedures are implemented where paving, surfacing, resurfacing, grinding, or sawcutting, may pollute storm water runoff or discharge to the storm drain system or watercourses.

### Limitations

- Finer solids are not effectively removed by filtration systems.
- Paving opportunities may be limited during wet weather.

### Standards and Specifications

- Release agents used to coat asphalt transport trucks and asphalt spreading equipment shall adhere to Standard Specifications Section 401 and shall be non-foaming and non-toxic.
- Place plastic materials under asphaltic concrete (AC) paving equipment while not in use, to catch and/or contain drips and leaks. See also BMP WM-4 "Spill Prevention and Control."
- When paving involves AC, the following steps should be implemented to prevent the discharge of grinding residue, uncompacted or loose AC, tack coats, equipment cleaners, or other paving materials:
  - Prevent sand and gravel from new asphalt from getting into storm drains, streets, and creeks.



- Old or spilled asphalt must be recycled or disposed of in accordance with Standard Specifications Section 404 or 107, respectively.
- AC grindings, pieces, or chunks used in embankments or shoulder material must not be allowed to enter any storm drains or watercourses. Install silt fence or inlet protection until structure is stabilized or permanent controls are in place.
- Collect and remove all broken asphalt and recycle when practical; otherwise, dispose in accordance with Standard Specification Section 107.
- During chip seal application and sweeping operations, petroleum, petroleum-covered aggregate, or fine particulates, must not be allowed to enter any storm drain or water courses. Apply temporary perimeter controls, such as inlet protection, until all chip seal materials are completely cured and sweeping of excess is complete.
- Use care during application of seal coat, tack coat, slurry seal, and/or fog seal near drainage inlet structures and manholes. To avoid introduction of these materials into the storm drain system or sewer, apply these materials by hand sprayer or brush when working adjacent to inlets, or cover drainage inlet structures and manholes with plastic.
- Seal coat, tack coat, slurry seal, or fog seal shall not be applied if rain is predicted to occur during the application or curing period.
- Paving equipment parked onsite shall be parked over plastic to prevent deminimus release to soil.
- Clean asphalt coated equipment off-site whenever possible. When cleaning dry, hardened asphalt from equipment, manage hardened asphalt debris as described in BMP WM-5, "Construction Debris and Litter Management". Any cleaning on site shall follow BMP NS-8, "Vehicle and Equipment Cleaning".
- Do not wash sweepings or grindings from exposed aggregate concrete into a storm drain system. Collect and return to aggregate base stockpile or dispose of per Standard Specification 107.
- If aggregate is washed on-site, allow aggregate rinse to settle. Then, either allow rinse water to dry in a temporary pit as described in BMP WM-06, "Concrete Waste Management", or dispose in accordance with Standard Specifications Section 202.
- Do not allow saw-cut Portland Concrete Cement (PCC) slurry to enter storm drains or watercourses.

## ***Pavement Grinding or Removal***

- Residue from grinding operations collected and contained, shall not be allowed to flow across the pavement, and shall not be left on the surface of the pavement. See also BMP WM-06, "Concrete Waste Management", and BMP WM-08, "Liquid Waste Management".
- Collect pavement digout material by mechanical or manual methods. This material may be recycled or, if allowed in the contract documents, used as shoulder material or base material at locations approved by the Engineer.
- If digout material cannot be recycled, dispose of in accordance with Standard Specifications Section 107.
- Digout activities shall not be conducted in the rain.
- Stockpile material removed from roadways away from drain inlets, drainage ditches, and watercourses, and store consistent with BMP WM-3, "Stockpile Management".
- Disposal or use of AC grindings shall be approved by the Engineer. See also BMP WM-06, "Concrete Waste Management."

## ***Raised/Recessed Pavement Marker Application and Removal***

- Do not transfer or load bituminous material near drain inlets, the storm water drainage system or watercourses.
- Melting tanks shall be loaded with care and not filled to beyond six inches from the top to leave room for splashing.
- When servicing or filling melting tanks, ensure all pressure is released before removing lids to avoid spills.
- On large-scale projects, use mechanical or manual methods to collect excess bituminous material from the roadway after removal of markers.
- Waste shall be disposed of in accordance with Standard Specifications Section 107 and 202.
- Inspect and maintain machinery regularly to minimize leaks and drips.
- Ensure that employees and subcontractors are implementing appropriate measures during paving operations.

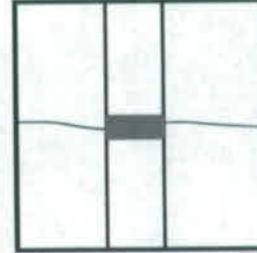
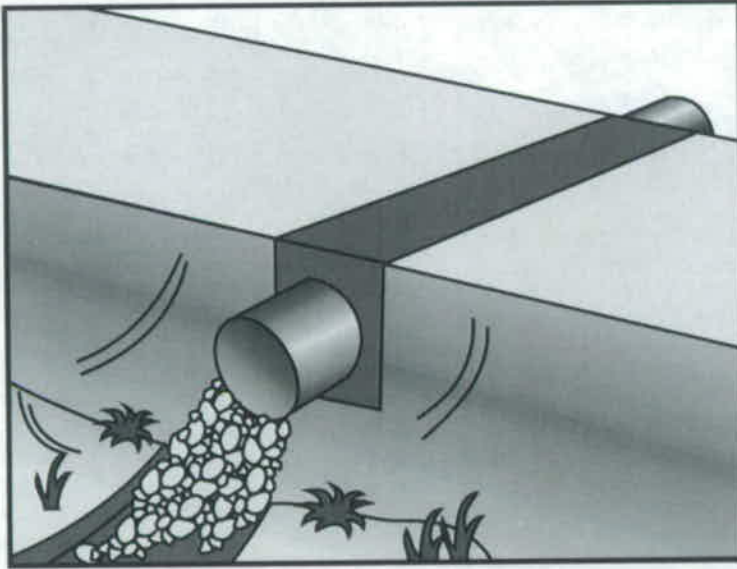
### **Maintenance and Inspection**



# Temporary Stream Crossing

**NS-4**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

### Definition and Purpose

A temporary stream crossing is a structure placed across a waterway that allows vehicles to cross the waterway during construction minimizing (or reducing or managing) erosion and downstream sedimentation caused by the vehicles.

### Appropriate Applications

Temporary stream crossings are installed at sites:

- Where appropriate permits have been secured.
- Where construction equipment or vehicles need to frequently cross a waterway.
- When alternate access routes are infeasible or impose significant constraints.
- When crossing perennial streams or waterways causes erosion.

### Limitations

- Will usually disturb the waterway during installation and removal.
- May require NDEP 401 Certification and/or U.S. Army Corps of Engineers 404 Permit. If numerical-based water quality standards are mentioned in any of these and other related permits, testing and sampling may be required. If monitoring related to these numerical-based water quality standards is not addressed in the contract documents, contact the Engineer.
- Installation may require dewatering or temporary diversion of the stream. See BMP NS-2, "Dewatering Operations", and NS-5, "Clear Water Diversion".
- May become a constriction in the waterway, which can obstruct flood flow and cause flow backups or washouts. If improperly designed,

flow backups can cause flooding and increase the pollutant load through washouts and scouring.

- Use of natural or other gravel in the stream for construction of Cellular Confinement System (CCS) ford crossing will be contingent upon approval by fisheries agencies.
- Ford crossings may degrade water quality due to contact with vehicles and equipment.
- CCS should not be used in excessively high or fast flows.
- The use of soil stabilizers within 60 ft of a stream or other receiving water is typically prohibited by regulatory and permit restrictions.
- Upon completion of construction activities, CCS blocks must be removed from stream.

## Standards and Specifications

### **General Considerations**

Location of the temporary stream crossing shall address:

- Site selection where erosion potential is low.
- Areas where the side slopes from highway runoff will not spill into the side slopes of the crossing.

The following types of temporary stream crossings shall be considered:

- Culverts - Used on perennial and intermittent streams.
- Fords - Appropriate during the dry season in arid areas. Used on dry washes and ephemeral streams, and low flow perennial streams. CCS, a type of ford crossing, is also appropriate for use in streams.
- Bridges - Appropriate for streams with high flow velocities, steep gradients and/or where temporary restrictions in the channel are not allowed.

Design and installation requires knowledge of stream flows and soil strength. Designs shall be prepared under direction of, and approved by, a registered civil and/or structural engineer. Both hydraulic and construction loading requirements shall be considered with the following:

- Comply with the requirements for culvert and bridge crossings, as contained in the NDOT's Drainage Manual and Bridge Manual, particularly if the temporary stream crossing will remain through the rainy season.
- Provide stability in the crossing and adjacent areas to withstand the design flow. The design flow and safety factor shall be selected based



# Temporary Stream Crossing

**NS-4**

Adapted from Caltrans Construction Site BMPs

on careful evaluation of the risks due to over topping, flow backups, or washout.

- Avoid oil or other potentially hazardous waste materials for surface treatment.

## **Construction Considerations:**

- Stabilize construction roadways, adjacent work area and stream bottom against erosion.
- Construct during dry periods to minimize stream disturbance and reduce costs.
- Construct at or near the natural elevation of the streambed to prevent potential flooding upstream of the crossing.
- Install temporary sediment control BMPs in accordance with guidance in Section 4 to minimize erosion of embankment into flow lines.
- Vehicles and equipment shall not be driven, operated, fueled, cleaned, maintained, or stored in the wet or dry portions of a water body where wetland vegetation, riparian vegetation, or aquatic organisms may be destroyed, except as authorized by the Engineer, as necessary to complete the work. Review the "Temporary Permit for Working in Waterways" for additional project specific requirements.
- Temporary water body crossings and encroachments shall be constructed to minimize scour. Cobbles used for temporary water body crossings or encroachments shall be clean, rounded river cobble.
- The exterior of vehicles and equipment that will encroach on the water body within the project shall be maintained free of grease, oil, fuel, and residues in accordance with the "Temporary Permit for Working in Waterways".
- Disturbance or removal of vegetation shall be minimized to complete operations. Precautions shall be taken to avoid damage to vegetation by people or equipment. Disturbed vegetation shall be replaced with the appropriate soil stabilization measures.
- Riparian vegetation, when removed pursuant to the provisions of the work, shall be cut off no lower than ground level to promote rapid regrowth. Access roads and work areas built over riparian vegetation shall be covered by a sufficient layer of clean river run cobble to prevent damage to the underlying soil and root structure. The cobble shall be removed upon completion of project activities.
- Any temporary artificial obstruction placed within flowing water shall only be built from material, such as clean gravel that will cause little or

no siltation.

- Drip pans shall be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than one hour.
- Conceptual temporary stream crossings are shown in figures at the end of this section.

### ***Specific Considerations:***

- Culverts are relatively easy to construct and able to support heavy equipment loads.
- Fords are the least expensive of the crossings, with maximum load limits.
- Temporary fords are not appropriate if construction will continue through rainy season, if thunderstorms are likely, or if the stream is perennial.
- CCS crossing structures consist of clean, washed gravel and cellular confinement system blocks. CCS are appropriate for streams that would benefit from an influx of gravel; for example, salmonid streams, streams or rivers below reservoirs, and urban, channelized streams. Many urban stream systems are gravel-deprived due to human influences, such as dams, gravel mines, and concrete channels.
- CCS allow designers to use either angular or naturally occurring, rounded gravel, because the cells provide the necessary structure and stability. In fact, natural gravel is optimal for this technique, because of the habitat improvement it will provide after removal of the CCS.
- A gravel depth of 6 to 12 in. for a CCS structure is sufficient to support most construction equipment.
- An advantage of a CCS crossing structure is that relatively little rock or gravel is needed, because the CCS holds the gravel in place and provides the stability.
- Bridges are generally more expensive to design and construct, but provides the least disturbance of the streambed and constriction of the waterway flows.

### **Maintenance and Inspection**

Maintenance provisions shall include:

- Periodic removal of debris behind fords, in culverts, and under bridges.
- Replacement of lost protective aggregate from inlets and outlets of culverts.
- Removal of temporary crossing promptly when it is no longer needed.



# Temporary Stream Crossing

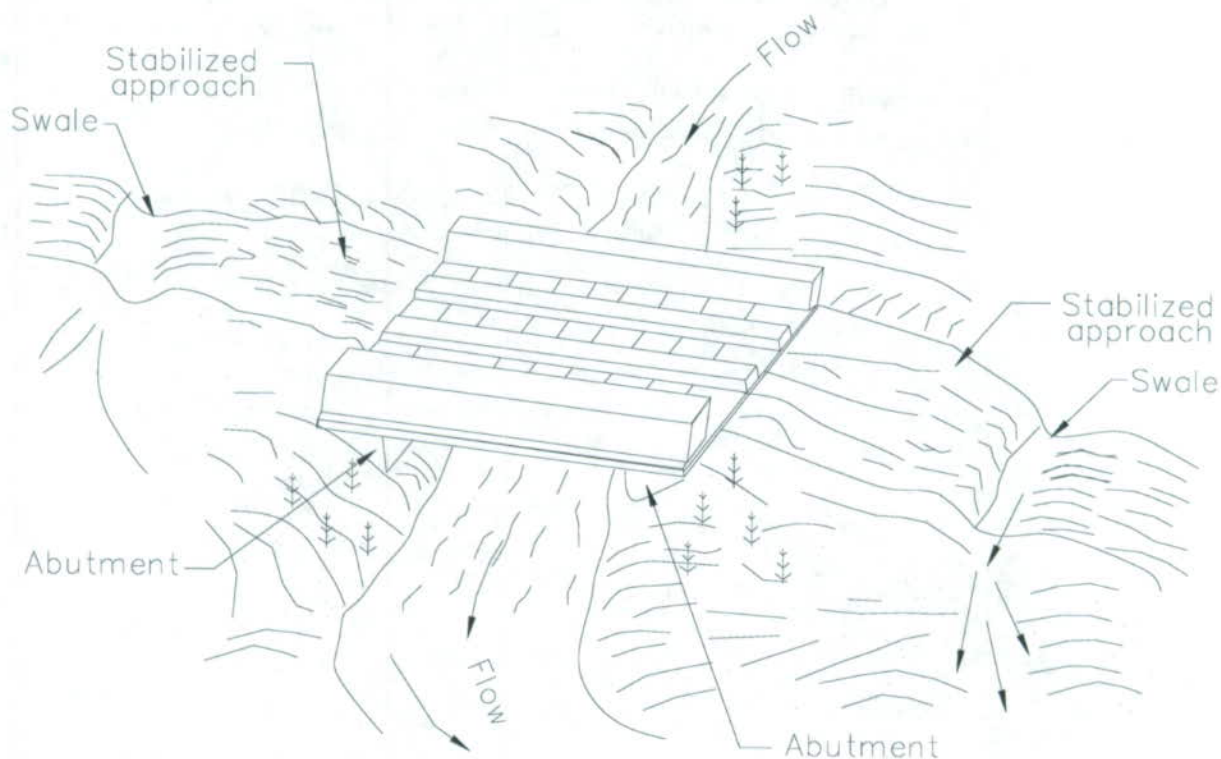
**NS-4**

Adapted from Caltrans Construction Site BMPs

After removing the crossing structure, restore stream channel to its original condition as required in the contract documents and applicable permits. In some cases it may be allowable to leave gravel in place.

Inspection shall, at a minimum, occur weekly and before, during and immediately after each significant rainfall, and include:

- Checking for blockage in the channel, debris buildup in culverts or behind fords, and under bridges.
- Checking for erosion of abutments, channel scour, riprap displacement, or piping in the soil.
- Checking for structural weakening of the temporary crossing, such as cracks, and undermining of foundations and abutments.



NOTE:

Surface flow of road diverted by swale and/or dike.

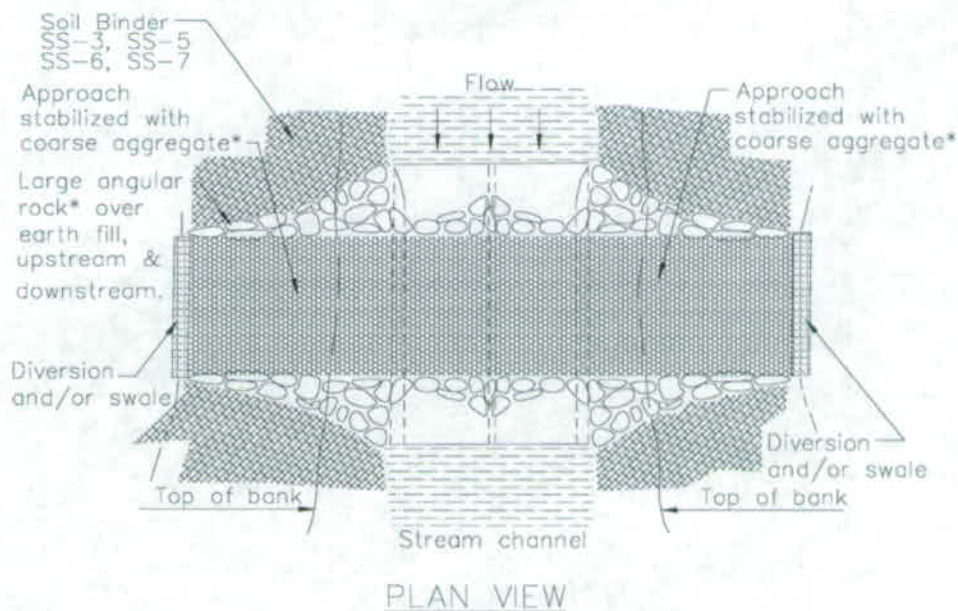
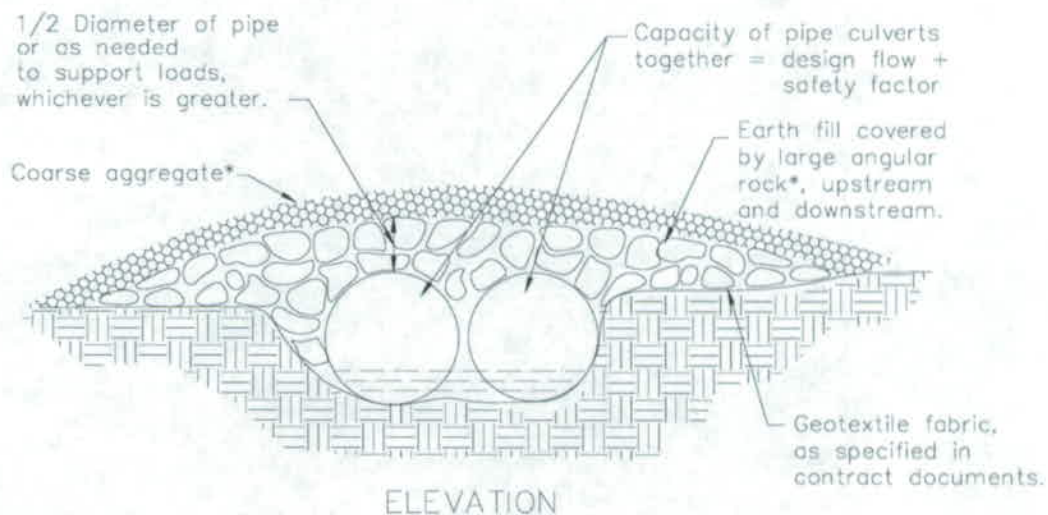
TYPICAL BRIDGE CROSSING  
NOT TO SCALE



# Temporary Stream Crossing

**NS-4**

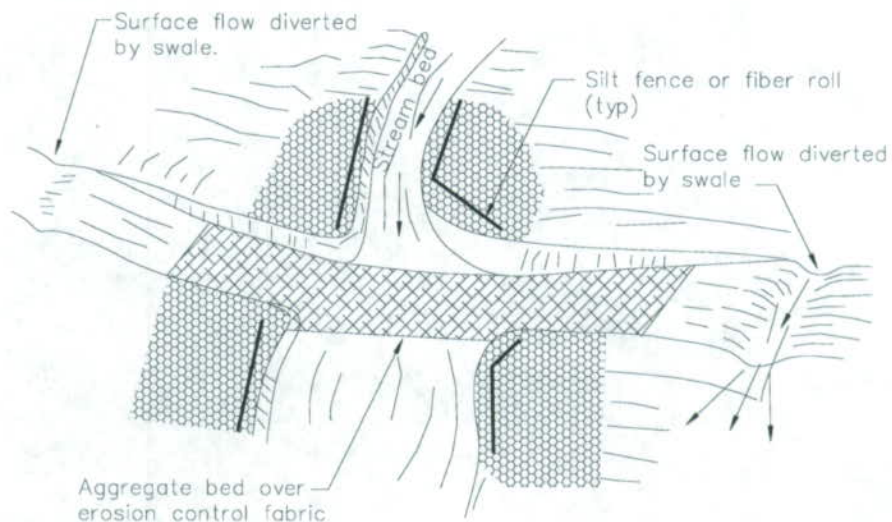
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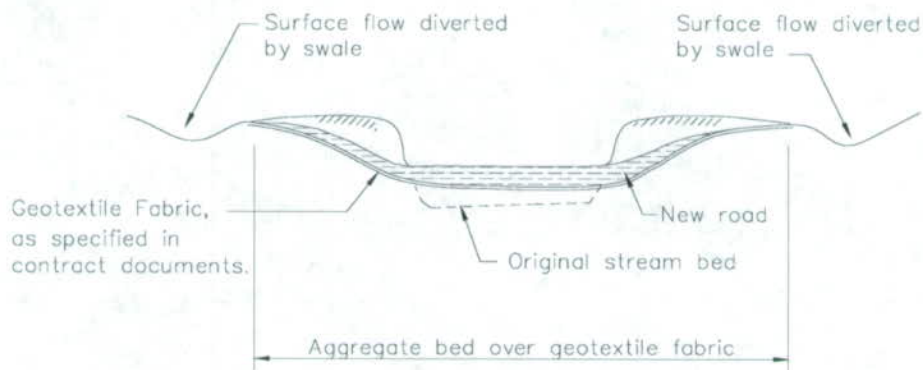
TYPICAL CULVERT CROSSING  
NOT TO SCALE

## NOTE

\* UNLESS SPECIFIED OTHERWISE, FOR COARSE AGGREGATE, USE CLASS 150 RIRRAP BEDDING. FOR LARGE ANGULAR ROCK USE CLASS 150 RIRAP.



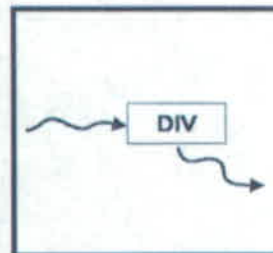
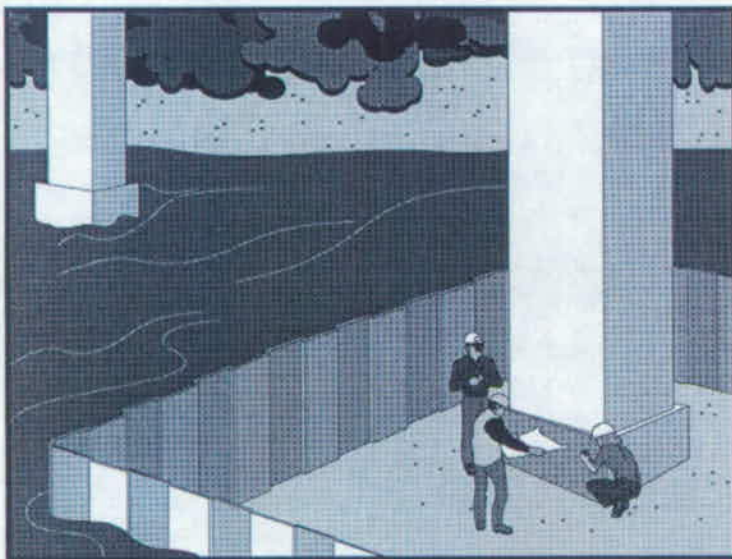
Aggregate approach  
5:1 (H:V) Maximum slope on road



TYPICAL FORD CROSSING  
NOT TO SCALE



Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

## Definition and Purpose

Clear water diversions consists of various structures and measures that intercept clear surface water runoff upstream of a project site, transport it around the work area, and discharge it downstream with minimal water quality degradation by either the project construction operations or the construction of the diversion. Clear water diversions are used in a waterway to enclose a construction area and reduce sediment pollution from construction work occurring in or adjacent to water. Isolation techniques are methods that isolate near shore work from a water body. Structures commonly used as part of this system include diversion ditches, berms, dikes, slope drains, rock, gravel bags, wood, aqua barriers, cofferdams, silt fence fabric or turbidity curtains, drainage and interceptor swales, pipes, or flumes.

## Appropriate Applications

- A clear water diversion is typically implemented where appropriate USACE, NDEP, and other local permits have been secured and work must be performed in a live stream or water body.
- Clear water diversions are appropriate for isolating construction activities occurring within or near a water body such as streambank stabilization, or culvert, bridge, pier or abutment installation. They may also be used in combination with other methods, such as clear water bypasses and/or pumps.
- Pumped diversions are suitable for intermittent and low flow streams. Excavation of a temporary bypass channel or passing the flow through a flume is appropriate for the diversion of streams less than 20 ft. wide, with flow rates less than 99 ft<sup>3</sup>/sec.
- Clear water diversions incorporating clean washed gravel may be appropriate for use in salmon spawning streams.

- Limitations**
- Diversion/encroachment activities will usually disturb the waterway during installation and removal of diversion structures.
  - Specific permit requirements or mitigation measures, such as the USACE, U.S. Fish and Wildlife Service (USFWS), NDEP, etc. may be included in contract documents because of clear water diversion/encroachment activities.
  - Diversion/encroachment activities may constrict the waterway, which can obstruct flows and cause flooding or washouts.
  - Diversion structures should not be installed without identifying potential impacts to the stream channel.
  - Diversion or isolation activities are inappropriate in deep water unless designed or reviewed by a Hydraulic engineer.
  - Diversion or isolation activities should not completely dam stream flow.
  - Dewatering and removal may require additional sediment control or water treatment (See NS-2).

**Standards and Specifications**

**General**

- Implement guidelines presented in SS-12, Streambank Stabilization to minimize impacts to streambanks.
- Where working areas encroach on live streams, barriers adequate to prevent the flow of muddy water into streams shall be constructed and maintained between working areas and streams. During construction of the barriers, muddying of streams shall be held to a minimum.
- Where possible, avoid or minimize diversion/encroachment impacts by scheduling construction during periods of low flow or when the stream is dry. See also the project special provisions for scheduling requirements. Scheduling shall also consider seasonal releases of water from dams, fish migration and spawning seasons, and water demands due to crop irrigation.
- Diversion structures must be adequately designed to accommodate fluctuations in water depth or flow volume due to tides, storms, flash floods, etc.
- Heavy equipment driven in wet portions of a water body to accomplish work shall be completely clean of dirt and petroleum residue, and water levels shall be below the gearboxes of the equipment in use, or lubricants and fuels are sealed such that inundation by water shall not result in leaks. Review the project's "Temporary Permit for Working Waterways/Discharge Permit" for



additional project specific requirements.

- Excavation equipment buckets may reach out into the water for the purpose of removing or placing fill materials. Only the bucket of the crane/excavator/backhoe may operate in a water body. The main body of the crane/excavator/backhoe shall not enter the water body, except as necessary to cross the stream to access the work site.
- Stationary equipment such as motors and pumps, located within or adjacent to a water body, shall be positioned over drip pans.
- When any artificial obstruction is being constructed, maintained, or placed in operation, sufficient water shall, at all times, be allowed to pass downstream to maintain aquatic life downstream.
- The exterior of vehicles and equipment that will encroach on a water body within the project shall be maintained free of grease, oil, fuel, and residues.
- Equipment shall not be parked below the high water mark overnight unless allowed by a permit.
- Disturbance or removal of vegetation shall not exceed the minimum necessary to complete operations. Precautions shall be taken to avoid damage to vegetation by people or equipment. Disturbed vegetation shall be replaced with the appropriate soil stabilization measures.
- Riparian vegetation, when removed pursuant to the provisions of the work, shall be cut off no lower than ground level to promote rapid re-growth. Access roads and work areas built over riparian vegetation shall be covered by a sufficient layer of clean river run cobble to prevent damage to the underlying soil and root structure. The cobble shall be removed upon completion of project activities.
- Drip pans shall be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than one hour.
- Construct diversion structures with materials free of potential pollutants such as soil, silt, sand, clay, grease, or oil.

### ***Temporary Diversions/Encroachments***

- Construct diversion channels in accordance with BMP SS-9, "Earth Dikes/Drainage Swales, and Ditches".
- In high flow velocity areas, stabilize slopes of embankments and diversion ditches using an appropriate liner, such as riprap in accordance with Standard Specifications Section 610 or with geotextile fabrics or erosion control mats as described in BMP SS-7,

"Geotextiles, Mats, Plastic Covers and Erosion Control Blankets", and in Standard Specifications Section 211, or combinations of these measures.

- Where appropriate, use natural streambed materials such as large cobbles and boulders for temporary embankment/slope protection, or other temporary soil stabilization methods.
- Provide for velocity dissipation at transitions in the diversion, such as the point where the stream is diverted to the channel and the point where the diverted stream is returned to its natural channel. See also BMP SS-10, "Outlet Protection/Velocity Dissipation Devices".

#### ***Temporary Dry Construction Areas***

- When dewatering behind temporary structures to create a temporary dry construction area, such as coffer dams, pass pumped water through a sediment settling device, such as a portable tank or settling basin, before returning water to the water body; see also BMP NS-2, "Dewatering Operations".
- If the presence of polluted water or sediment is identified in the contract, the contractor shall implement dewatering pollution controls as required by the contract documents. If the quality of water or sediment to be removed while dewatering is not identified as polluted in the contract documents, but is later determined by observation or testing to be polluted, the contractor shall notify the Engineer and comply with NDEP requirements.
- Any substance used to assemble or maintain diversion structures, shall be non-toxic and non-hazardous.
- Any material used to minimize seepage underneath diversion structures, such as grout, shall be EPA-approved, non-toxic, non-hazardous, and as close to a neutral pH as possible.

#### ***Isolation Techniques:***

Isolation techniques are methods that isolate near shore work from a water body. Techniques include sheet pile enclosures, water filled geotextile (Aqua Dam), gravel berm with impermeable membrane, gravel bags, cofferdams, and Portable Precast Concrete Barrier Rails (PPCBR).

#### ***Comparison of Diversion/Isolation Techniques:***

- Gravel bags are relatively inexpensive, but installation and removal can be labor intensive. It is also difficult to dewater the isolated area.



- Gravel bag berms (SC-6) used in conjunction with an impermeable membrane are cost effective, not labor intensive to install, and can be dewatered relatively easily. If spawning gravel is used, the impermeable membrane can be removed from the stream, and the gravel can be spread out and left as salmonid spawning habitat per USACE and USFWS permit only. Contact NDOT biologists for jobsite specific requirements.
- Aqua Barriers and cofferdams are relatively expensive, but frequently allow full dewatering. Also, many options now available are relatively easy to install. Sealants used in these structures shall be non-toxic.
- Sheet pile enclosures are a much more expensive solution, but do allow full dewatering. This technique is not well suited to small streams, but can be effective on large rivers or lakes, and where staging and heavy equipment access areas are available. Also they are useful for a water body with a sandy, non-cobble substrate.
- Portable Precast Concrete Barrier Rails (PPCBR) is an isolation method that does not allow full dewatering, but can be used in small to large watercourses, and in fast water situations.
- Turbidity curtains should be used where sediment discharge to a stream is unavoidable. They can also be used for in stream construction, when dewatering an area is not required. Turbidity curtains should be used with floatation collars and recommended for use in calm, slow moving water; must be properly anchored.
- Diversion structures should be installed following manufacturer's specification.
- Some diversions may require the acquisition of additional right-of-way or easements and could therefore add significant cost to the project. Diversion requirements must be identified early in the planning process so that all alternatives can be accurately assessed and additional costs can be minimized.
- When used in watercourses or streams, cofferdams must be used in accordance with permit requirements and/or the contract documents. Materials for cofferdams should be selected based on ease of maintenance, and complete removal following construction activities. Soil cofferdams are not permitted.

### ***Silt Fence Fabric Isolation Technique***

#### ***Definition and Purpose:***

A silt fence fabric isolation structure is a temporary structure built into a waterway to enclose a construction area and reduce sediment pollution

from construction work in or adjacent to water. This structure is composed of silt fence fabric, gravel bags, and steel t-posts in accordance with Standard Specifications Section 724.

*Appropriate Applications:*

- Silt fence fabric may be used for construction activities such as streambank stabilization, or culvert, bridge, pier or abutment installation. It may also be used in combination with other methods, such as clean water bypasses and/or pumps.
- This method involves placement of gravel bags or continuous berms to 'key-in' the fabric, and subsequently staking the fabric in place.
- If spawning gravel is used, all other components of the isolation can be removed from the stream, and the gravel can be spread out and left as salmonid spawning habitat. Whether spawning gravel or other types of gravel are used, only clean washed gravel should be used as infill for the gravel bags or continuous berm.
- This is a method that should be used in relatively calm water, and can be used in smaller streams

*Limitations:*

- Do not use if the installation, maintenance and removal of the structures will disturb sensitive aquatic species of concern.
- Not appropriate for projects where dewatering is necessary.
- Not appropriate to completely dam stream flow.

*Standards and Specifications:*

- For the silt fence fabric isolation method, a non-woven or heavy-duty fabric is recommended over standard silt fence. Using rolled geotextiles allows non-standard widths to be used.
- Anchor silt fence fabric with gravel bags filled with clean, washed gravel. Do not use sand. If a bag should split open, the gravel can be left in the stream, where it can provide aquatic habitat benefits.
- Another anchor alternative is a continuous berm, made with the Continuous Berm Machine. This is a gravel-filled bag that can be made in very long segments. The length of the berms is usually limited to 20 ft. for ease of handling.

*Installation*

- Place the fabric on the bottom of the stream, and place either a bag of clean, washed gravel or a continuous berm over the bottom of the



fabric, such that a bag-width of fabric lies on the stream bottom. The bag should be placed on what will be the outside of the isolation area.

- Pull the fabric up, and place a metal t-post immediately behind the fabric, on the inside of the isolation area; attach the silt fence to the post with three diagonal nylon ties. (See SC-1)
- Continue placing fabric as described above until the entire work area has been isolated, staking the fabric at least every 6 ft.

#### *Inspection and Maintenance:*

- During construction, inspect daily during the workweek.
- Perform additional inspections before, during and after storm events.
- Immediately repair any gaps, holes or scour.
- Remove sediment buildup in accordance with Standard Specifications Section 107.
- Remove BMP upon completion of construction activity.
- Re-vegetate areas disturbed by BMP removal if needed.

#### ***Turbidity Curtain Isolation Technique***

##### *Definition and purpose:*

A turbidity curtain is a relatively impervious fabric barrier used to isolate the near shore work area. The barriers are intended to confine the suspended sediment. The curtain is a floating barrier, and thus does not prevent water from entering the isolated area; rather, it prevents suspended sediment from getting out. This method is very good in isolating fine as well as coarse sediment.

##### *Appropriate applications:*

Turbidity curtains should be used where sediment discharge to a stream is unavoidable. They are used when construction activities adjoin quiescent waters, such as lakes, ponds, lagoons, bays, and slow flowing rivers. The curtains are designed to deflect and contain sediment within a limited area and provide sufficient retention time so that the soil particles will fall out of suspension.

##### *Limitations:*

- Turbidity curtains should not be used in flowing water; they are best suited for use in ponds, lakes, and very slow-moving rivers.

- Turbidity curtains should not be placed across the width of a channel.
- Removing sediment that has been deflected and settled out by the curtain may create a discharge problem through the re-suspension of particles and by accidental dumping by the removal equipment. Caution must be taken in removal.

*Standards and Specifications:*

- Turbidity curtains should be oriented parallel to the direction of flow.
- The curtain should extend the entire depth of the watercourse in calm-water situations.
- In wave conditions, the curtain should extend to within 1 ft. of the bottom of the watercourse, such that the curtain does not stir up sediment by hitting the bottom repeatedly. If it is desirable for the curtain to reach the bottom in an active-water situation, a pervious silt fence fabric may be used for the bottom 1 ft.
- The top of the curtain should consist of flexible flotation buoys, and the bottom shall be held down by a load line incorporated into the curtain fabric. The fabric shall be a brightly colored impervious mesh.
- The curtain shall be held in place by anchors placed per manufacturer's specifications or closer as situation dictates (i.e. currents). See turbidity curtain detail.
- First place the anchors, then tow the fabric out in a furled condition, and connect to the anchors. The anchors should be connected to the flotation devices, and not to the bottom of the curtain. Once in place, cut the furling lines, and allow the bottom of the curtain to sink.
- Sediment that has been deflected and settled out by the curtain should be removed; however, consideration must be given to the probable outcome of the removal procedure. It must be asked if it will create more of a sediment problem through re-suspension of the particles or by accidental dumping of material during removal. It is recommended that the soil particles accumulated by the turbidity curtain be removed only if it is deemed necessary by NDEP or the Engineer.
- Check manufacturer's requirements when installing turbidity curtains.



Adapted from Caltrans Construction Site BMPs

## *Maintenance and Inspection:*

- The curtain should be inspected daily for holes or other problems, and any repairs needed should be made promptly.
- Allow sediment to settle for prior to its removal or removal of the curtain. After removing sediment, wait at least 6-12 hours before removing the curtain.
- To remove, install furling lines along the curtain, detach from anchors, and tow out of the water.

## ***Type A Barrier Rail River Isolation***

### *Definition and Purpose:*

This is temporary sediment control, or stream isolation method that uses Portable Precast Concrete Barrier Rail (PPCBR) to form the sediment deposition area, or to isolate the in-stream or near-bank construction area.

Barriers are placed end-to-end in a pre-designed configuration and gravel-filled bags are used at the toe of the barrier and also at their abutting ends to seal and prevent movement of sediment beneath or through the barrier walls. A typical PPCBR installation is illustrated at the end of this Section.

### *Appropriate Applications:*

The PPCBR isolation can be used in streams with higher water velocities than many other isolation techniques.

### *Limitations:*

- The PPCBR method does not allow for full dewatering, but can be used in small to large watercourses, and in fast-water situations.

### *Standards and Specifications:*

- To create a floor for the PPCBR, move large rocks and obstructions. Place washed gravel or gravel-filled bags to create a level surface for PPCBR to sit.
- Place the bottom two PPCBR adjacent to each other, and parallel to the direction of flow; fill the center portion with gravel bags. Then place the third PPCBR on top of the bottom two; there should be sufficient gravel bags between the bottom PPCBRs such that the gravel supports the top one. Place plastic sheeting around the PPCBRs, and secure at the bottom with gravel bags.
- Further support can be added by pinning and cabling the PPCBRs together. Also, large riprap and boulders can be used to support

either side of the PPCBR, especially where there is strong current.

*Inspection and Maintenance:*

- The barrier should be inspected at least once daily, and any damage, movement, or other problems should be addressed immediately.
- Allow sediment to settle prior to its removal of the barrier. After removing sediment, wait at least 6-12 hours before removing the barrier.

***Stream Diversions***

*Definition and Purpose*

Stream diversions consists of a system of structures and measures that intercept an existing stream upstream of the project and transports it around the work area, and discharges it downstream (refer to Figure 3). The selection of which stream diversion technique to use depends upon the type of work involved, physical characteristics of the site, and the volume of water flowing through the project.

*Appropriate Applications:*

- Pumped diversions are appropriate in areas where de-watering is necessary.
- Dam-type diversion may serve as temporary access to the site.
- Where work areas require isolations from flows.

*Limitations:*

- Pump diversions have limited flow capacity.
- Pumped diversions require frequent monitoring of pumps.
- Large flows during storm events can overtop dams.
- Flow diversion and re-direction with small dams involves in-stream disturbance and mobilization of sediment.

*Standards and Specifications:*

- Installation guidelines will vary based on existing site conditions and type of diversion used.
- Diversions shall be sized to convey design flood flows.
- Pump capacity must be sufficient for design flow; the upper limit is approximately 10 ft<sup>3</sup>/sec (the capacity of two 8 in. pumps).
- Adequate energy dissipation must be provided at the outlet to minimize erosion.



- Dam materials used to create dams upstream and downstream of diversion should be erosion resistant. Materials such as steel plate, sheet pile, sandbags, continuous berms, inflatable water bladders, etc. would be acceptable.
- When constructing a diversion channel, begin excavation of the channel at the proposed downstream end, and work upstream. Once the watercourse to be diverted is reached, and the excavated channel is stable, breach the upstream end, and allow water to flow down the new channel. Once flow has been established in the diversion channel, install the diversion weir in the main channel; this will force all water to be diverted from the main channel.

*Advantages of a pumped diversion include:*

- Downstream sediment transport can be nearly eliminated.
- De-watering of the work area is possible.
- Pipes can be moved around to allow construction operations.
- The dams can serve as temporary access to the site.
- Increased flows can be managed by adding more pumping capacity.

*Disadvantages of a pumped diversion are:*

- Flow volume is limited by pump capacity.
- A pumped diversion may require 24-hour monitoring of pumps.
- Sudden rain could overtop dams.
- Erosion at the outlet.
- Minor in-stream disturbance is required to install and remove dams.

*Advantages of excavated channels and flumes are:*

- Excavated channels isolate work from water flow and allow dewatering.
- Excavated channels can handle larger flows than pumps.

*Disadvantages of excavated channels and flumes are:*

- Bypass channel or flume must be sized to handle flows, including possible floods.
- Channels must be protected from erosion.
- Flow diversion and re-direction with small dams involves in-stream disturbance and mobilization of sediment.

- May require acquisition of additional right-of-way or easements.

*Installation*

- Installation guidelines will vary based on existing site conditions and type of diversion used.

*Construction Guidelines:*

- Pump capacity must be sufficient for design flow; the upper limit is about 10 ft<sup>3</sup>/s (the capacity of two 8 in. pumps).
- Dam materials used to create dams upstream and downstream of diversion should be erosion resistant; materials such as steel plate, sheet piles, sandbags, continuous berms, inflatable water bladders, etc. would be acceptable.
- When constructing a diversion channel, begin excavation of the channel at the proposed downstream end, and work upstream. Once the watercourse to be diverted is reached and the excavated channels are stable, breach the upstream end and allow water to flow down the channel. Once flow has been established in the diversion channel, install the diversion weir in the main channel; this will force all water to be diverted from the main channel.

**Maintenance and  
Inspection**

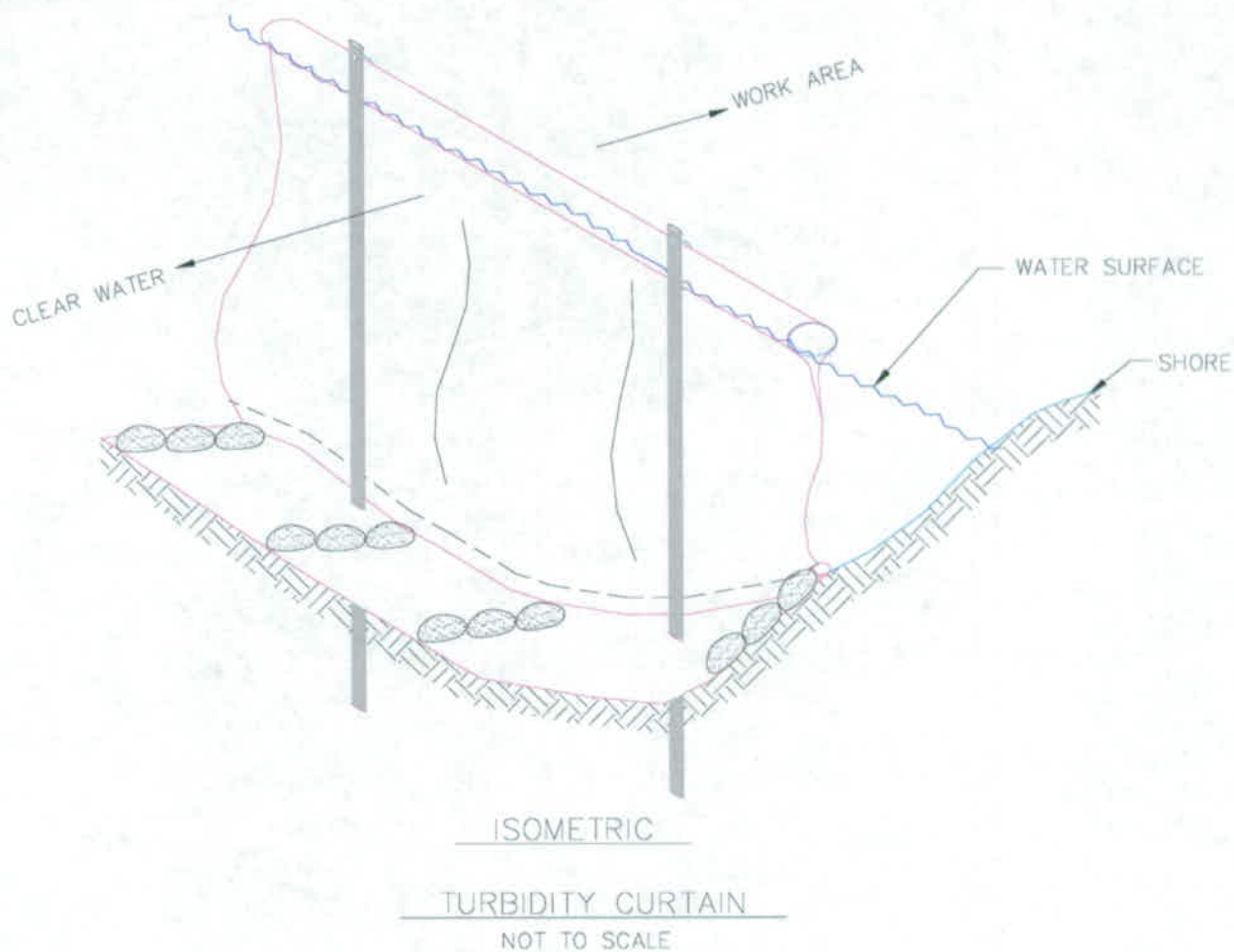
- Inspect diversion/encroachment structures before and after significant storms, and at least once per week while in service. Inspect daily during the construction.
- Pumped diversions may require frequent monitoring of pumps.
- Inspect embankments and diversion channels before, during and after significant storms, and at least once per week while in service for damage to the linings, accumulating debris, sediment buildup, and adequacy of the slope protection. Remove debris and repair linings and slope protection as required. Repair holes, gaps, or scour.
- Upon completion of work, the diversion or isolation structure should be removed and flow should be re-directed through the new culvert or back into the original stream channel. Recycle or re-use if applicable.
- Re-vegetate areas disturbed by BMP removal if needed.

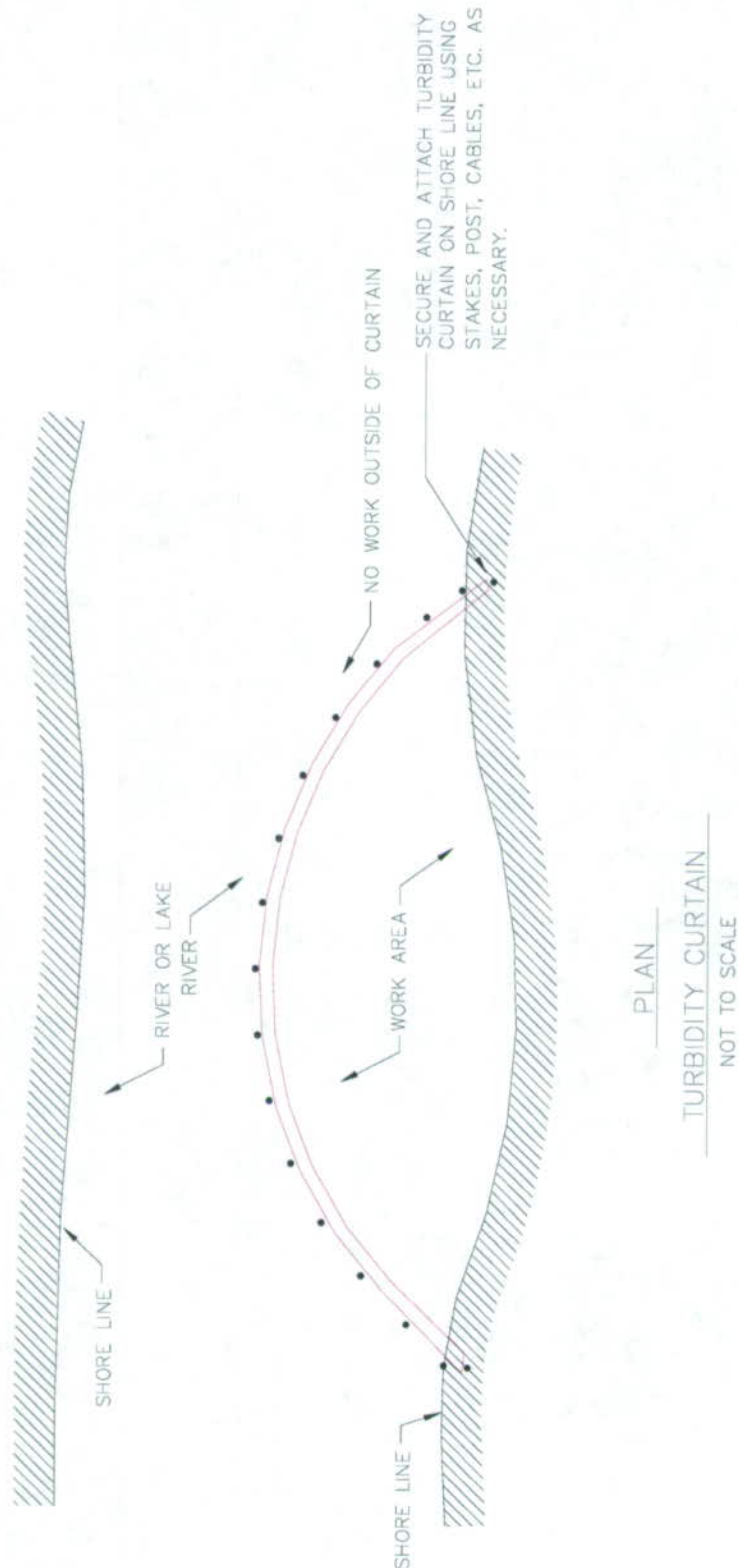


# Clear Water Diversion

NS-5

Adapted from Caltrans Construction Site BMPs



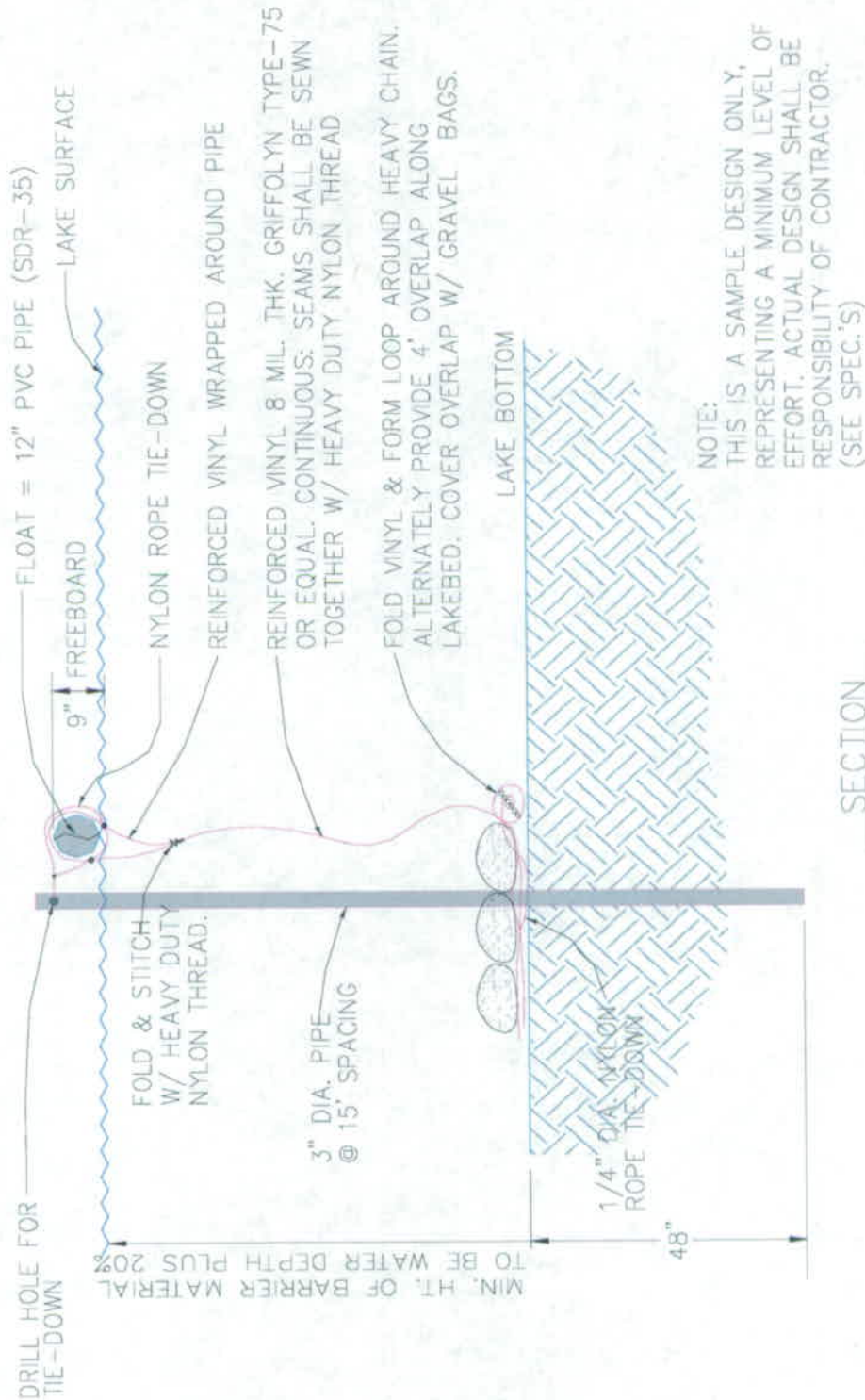




# Clear Water Diversion

**NS-5**

Adapted from Caltrans Construction Site BMPs

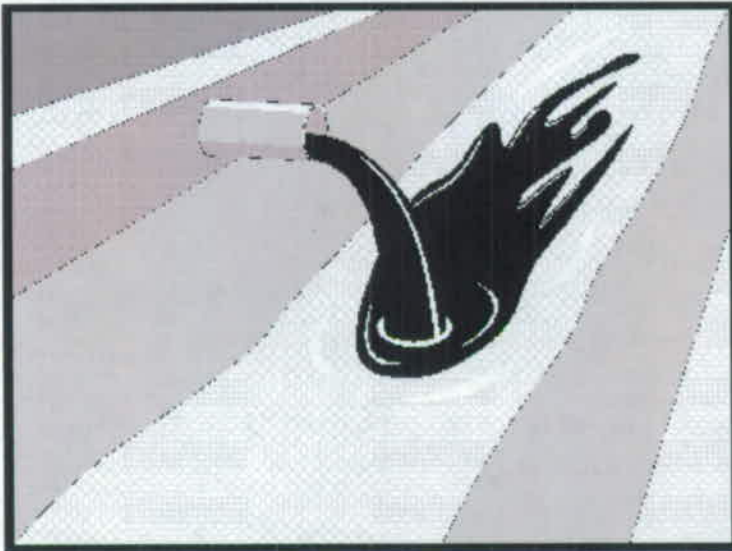


SECTION \_\_\_\_\_  
TURBIDITY CURTAIN  
NOT TO SCALE

# Illicit Connection/Illegal Discharge Detection and Reporting

**NS-6**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

## Definition and Purpose

Procedures and practices designed for construction contractors to recognize illicit connections or illegally dumped or discharged materials on a construction site and report incidents to the Engineer.

## Appropriate Applications

- Illicit connection/illegal discharge detection and reporting is applicable anytime an illicit connection or discharge is discovered or illegally dumped material is found on the construction site.
- This best management practice (BMP) applies to all construction projects.

## Limitations

- Unlabeled or non-identifiable material shall be assumed to be hazardous.
- Illicit connections and illegal discharges or dumping, for the purposes of this BMP, refer to discharges and dumping caused by parties other than the contractor.
- Procedures and practices presented in this BMP are general. Contractor shall use extreme caution, immediately notify the Engineer when illicit connections or illegal dumping or discharges are discovered.
- If pre-existing hazardous materials or wastes are known to exist on site, the contractor's responsibility will be detailed in separate special provisions.



# Illicit Connection/Illegal Discharge Detection and reporting

Adapted from Caltrans Construction Site BMPs

## Standards and Specifications

### *Planning*

- Inspect site before beginning the job for evidence of illicit connections or illegal dumping or discharges.
- Inspect site regularly during project execution for evidence of illicit connections or illegal dumping or discharges.
- Observe site perimeter for evidence or potential of illicitly discharged or illegally dumped material that may enter the job site.

### *Identification of Illicit Connections and Illegal Dumping or Discharges.*

- Solids - Look for debris, or rubbish piles. Solid waste dumping often occurs on roadways with light traffic loads or in areas not easily visible from the traveled way.
- Liquids - signs of illegal liquid dumping or discharge can include:
  - Visible signs of staining or unusual colors to the pavement or surrounding adjacent soils
  - Pungent odors coming from the drainage systems.
  - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes.
  - Abnormal water flow during the dry weather season.
- Urban Areas - Evidence of illicit connections or illegal discharges is typically detected at storm drain outfall locations or at manholes. Signs of an illicit connection or illegal discharge can include:
  - Abnormal water flow during the dry weather season.
  - Unusual flows in subdrain systems used for dewatering.
  - Pungent odors coming from the drainage systems.
  - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes.
  - Excessive sediment deposits, particularly adjacent to or near active off-site construction projects.
- Rural Areas - Illicit connections or illegal discharges involving irrigation drainage ditches are detected by visual inspections. Signs of an illicit discharge can include:
  - Abnormal water flow during the dry weather season.

# Illicit Connection/Illegal Discharge Detection and Reporting

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**NS-6**

Adapted from Caltrans Construction Site BMPs

- Non-standard junction structures.
- Broken concrete or other disturbances at or near junction structures.

## ***Reporting***

- Notify the Engineer of any illicit connections and illegal dumping or discharge incidents at the time of discovery. The Engineer will notify NDOT Environmental Division who will in turn notify the appropriate agency or agencies.

## **Cleanup and Removal**

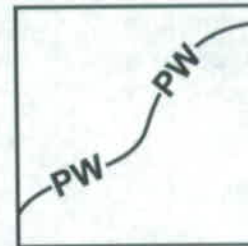
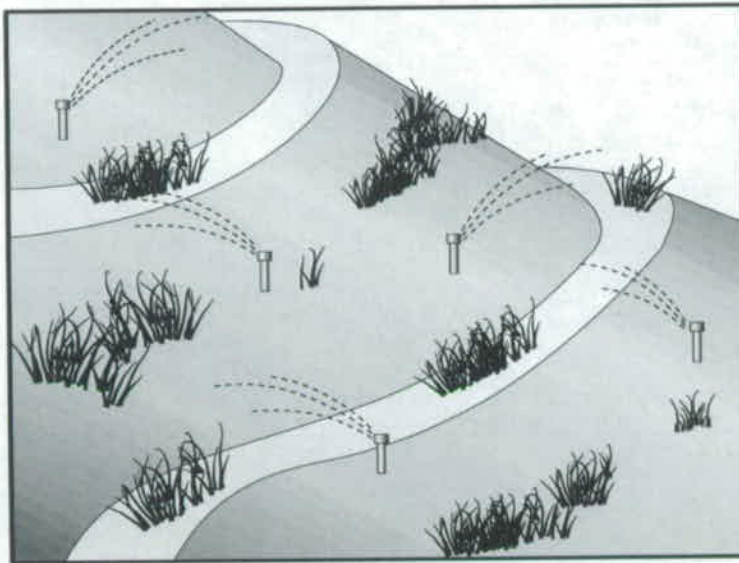
The contractor is not responsible for investigation and clean up of illicit or illegal dumping or discharges not generated by the contractor. NDOT may direct contractor to clean up non-hazardous dumped or discharged material on the construction site.



# Potable Water/Irrigation

NS-7

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose	Potable Water/Irrigation management consists of practices and procedures to manage the discharge of potential pollutants generated during discharges from irrigation water lines, landscape irrigation, lawn or garden watering, planned and unplanned discharges from potable water sources, water line flushing, and hydrant flushing.
Appropriate Applications	Implement this BMP whenever the above activities or discharges occur at or enter a construction site.
Limitations	None identified.
Standards and Specifications	<ul style="list-style-type: none"><li>■ Inspect irrigated areas within the construction limits for excess watering. Minimize irrigation down time. Shut water off before cutting pipe. Consider factors such as soil structure, grade, time of year, and type of plant material in determining the proper amounts of water for a specific area.</li><li>■ Where possible, direct water from off-site sources around or through a construction site in a way that minimizes contact with the construction site.</li><li>■ When possible, discharges from water line flushing shall be reused for landscaping purposes.</li><li>■ Shut off the water source to broken lines, sprinklers, or valves as soon as possible to prevent excess water flow.</li><li>■ Protect downstream storm water drainage systems and watercourses from water pumped or bailed from trenches excavated to repair water lines.</li></ul>

**Maintenance and  
Inspection**

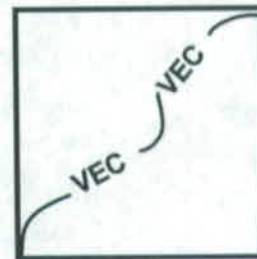
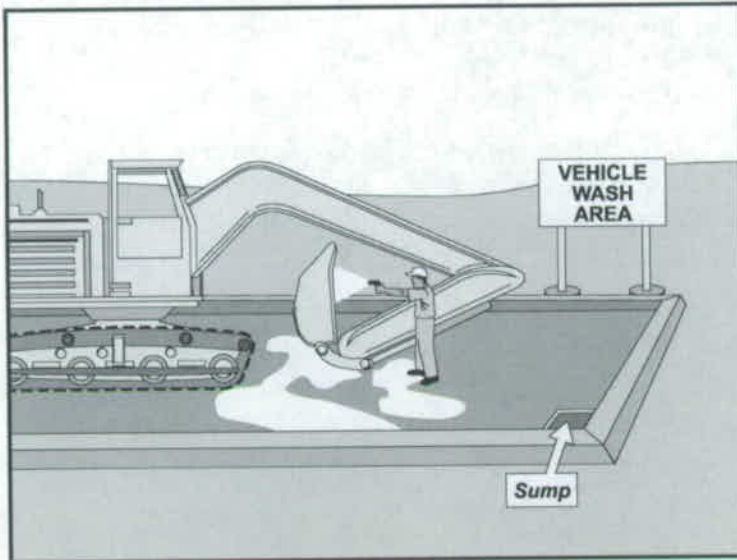
- Repair broken water lines as soon as possible or as directed by the Engineer.
- Inspect irrigated areas regularly for signs of erosion and/or discharge.



# Vehicle and Equipment Cleaning

**NS-8**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

**Definition and Purpose** Vehicle and equipment cleaning procedures and practices are used to minimize or eliminate the discharge of pollutants from vehicle and equipment cleaning operations to storm drain system or to watercourses.

**Appropriate Applications** These procedures are applied on all construction sites where vehicle and equipment cleaning is performed.

**Limitations** None.

- Standards and Specifications**
- On-site vehicle and equipment washing shall only be performed within contained areas where all wash water can be collected and treated. No washing shall occur over bare soil.
  - Cleaning of vehicles and equipment with detergents, solvents or steam shall not occur on the project site unless the Engineer has been notified in advance and the resulting wastes are fully contained and disposed of outside the highway right-of-way in conformance with the provisions in Standard Specifications Section 107.
  - Sediment laden wash water shall be captured for treatment prior to discharge. Wash water shall be treated using sediment control BMPs such as SC-2 or SC-3. Discharge of treated wash water to infiltration facilities or sewers must receive prior approval from NDOT's WQS.
  - Wash water containing solvents or hazardous substances shall be containerized and disposed of in accordance with Standard Specifications Section 107. Water containing hazardous materials shall not be percolated or evaporated.

- All vehicles/equipment that regularly enter and leave the construction site must be cleaned off-site in accordance with Standard Specifications Section 107.
- When vehicle/equipment washing/cleaning must occur on-site, and the operation cannot be located within a structure or building equipped with appropriate disposal facilities, the outside cleaning area shall have the following characteristics, and shall be arranged with the Engineer:
  - Located away from storm drain inlets, drainage facilities, or watercourses
  - Paved with concrete or asphalt and bermed with an impermeable material to contain wash waters and to prevent run-on and runoff
  - Configured with a sump to allow collection and disposal of wash water
  - Wash waters shall not be discharged to storm drains or watercourses
  - Used only when necessary
- When cleaning vehicles/equipment with water:
  - Use as little water as possible. High-pressure sprayers may use less water than a hose, and shall be considered.
  - Use positive shutoff valve to minimize water usage.
  - Facility wash racks shall discharge to a sanitary sewer, recycle system or other approved discharge system and shall not discharge to the storm drainage system or watercourses.
- The control measure shall be inspected at a minimum of once a day.
- Monitor employees and subcontractors throughout the duration of the construction project to ensure appropriate practices are being implemented.
- Inspect sump regularly and remove liquids and sediment as needed to ensure intended use and function is maintained.

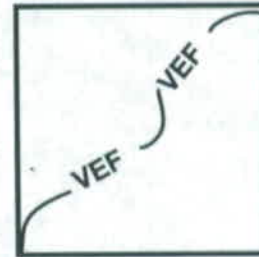
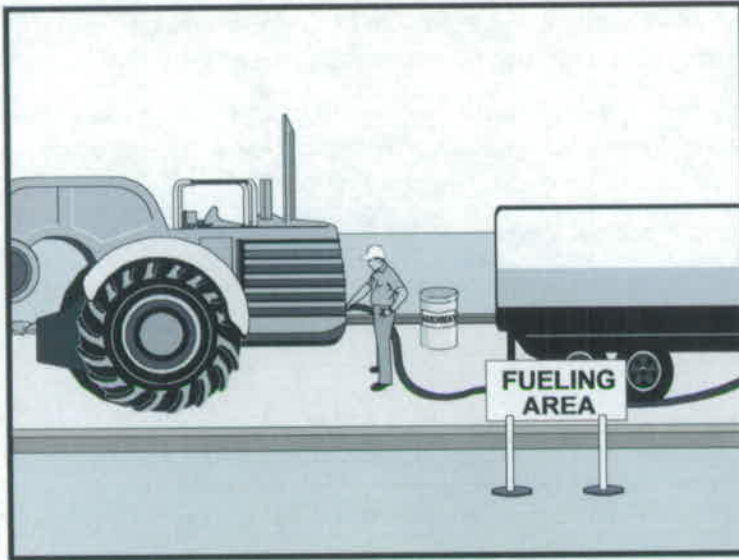
## Maintenance and Inspection



# Vehicle and Equipment Fueling

**NS-9**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

**Definition and Purpose** Vehicle and equipment fueling procedures and practices are designed to prevent the discharge of fuel spills and leaks into storm drain systems or to watercourses.

**Appropriate Applications** These procedures are applied on all construction sites where vehicle and equipment fueling takes place.

**Limitations** ■ On-site vehicle and equipment fueling shall only be used where it's impractical to send vehicles and equipment off-site for fueling.

- Standards and Specifications**
- When fueling must occur on-site, the contractor shall select and designate an area to be used.
  - Absorbent spill clean-up materials and spill kits shall be available in fueling areas and on fueling trucks and shall be disposed of properly after use in accordance with Standard Specifications Section 107
  - Drip pans or absorbent pads shall be used during vehicle and equipment fueling, unless the fueling is performed over an impermeable containment area in a dedicated fueling area.
  - Dedicated fueling areas shall be protected from storm water run-on and runoff, and shall be located at least 100 ft. from downstream drainage facilities and watercourses per the Temporary Work in Waterways/Discharge Permit. Fueling must be performed on level-grade areas.
  - Nozzles used in vehicle and equipment fueling shall be equipped with an automatic shut-off to control drips. Fueling operations shall not be left unattended.

## Maintenance and Inspection

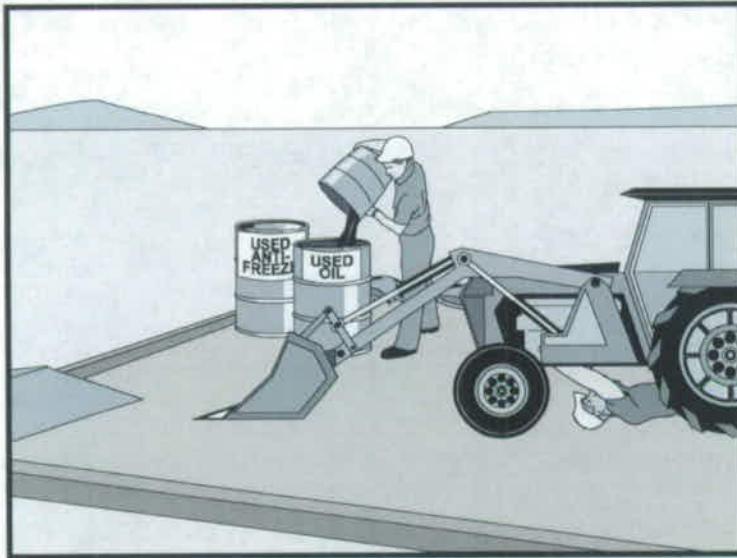
- Protect fueling areas with impermeable berms and/or dikes to prevent storm water run-on, runoff, and to contain spills.
- Use vapor recovery nozzles to help control drips as well as air pollution where required by air quality permits and regulations. Ensure the nozzle is secured upright when not in use.
- Fuel tanks shall not be "topped-off."
- Vehicles and equipment shall be inspected on each day of use for leaks. Leaks shall be repaired immediately on problem vehicles or equipment shall be removed from the project site.
- Absorbent spill clean-up materials shall be available and appropriately identified in fueling and maintenance areas and used on small spills instead of hosing down or burying techniques. The spent absorbent material shall be removed promptly and disposed of properly in accordance with Standard Specifications Section 107.
- Federal, state, and local requirements shall be observed for any fueling facility and stationary above ground storage tanks. Refer to WM-1 "Material Delivery and Storage."
- Fueling areas and storage tanks shall be inspected daily.
- Keep an ample supply of spill cleanup material on the site.
- Immediately clean up spills and properly dispose of contaminated soil and cleanup materials.



# Vehicle and Equipment Maintenance

**NS-10**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose	Procedures and practices to prevent the discharge of pollutants to the storm drain systems or to watercourses from vehicle and equipment maintenance procedures.
Appropriate Applications	These procedures are applied on all construction projects where an on-site yard area is necessary for storage and maintenance of heavy equipment and vehicles.
Limitations	None identified.
Standards and Specifications	<ul style="list-style-type: none"><li>■ Drip pans or absorbent pads shall be used during vehicle and equipment maintenance work that involves fluids, unless the maintenance work is performed over an impermeable surface in a contained, dedicated maintenance area.</li><li>■ Dedicated maintenance areas shall be protected from storm water run-on and runoff, and shall be located at least 100 ft. from downstream drainage facilities and watercourses per the Temporary Work in Waterways/Discharge Permit.</li><li>■ Drip Pans or plastic sheeting shall be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than one hour.</li><li>■ Absorbent spill clean-up materials shall be available and clearly identified in maintenance areas and shall be disposed of properly after use in accordance with Standard Specifications Section 107.</li><li>■ Use off-site maintenance facilities whenever practical.</li></ul>

## **NS-10** Vehicle and Equipment Maintenance

Adapted from Caltrans Construction Site BMPs

### Maintenance and Inspection

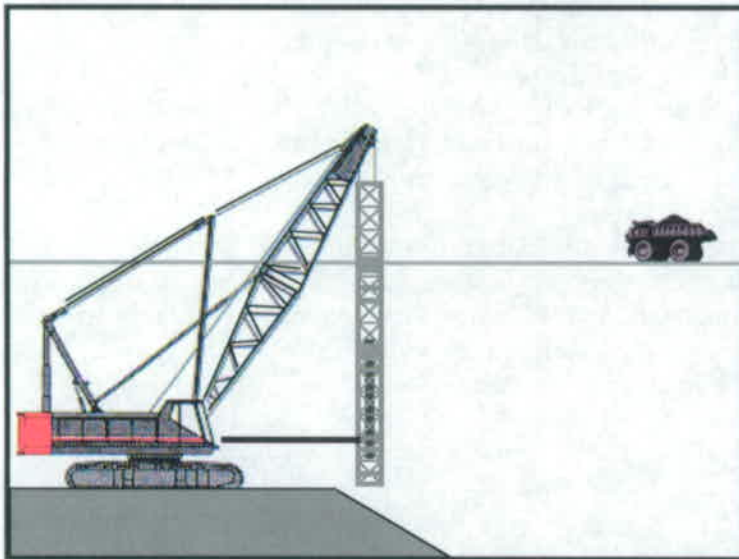
- For long-term projects, consider constructing roofs or using portable tents over maintenance areas.
- Properly dispose of or recycle tires, batteries, petroleum products and spill cleanup materials in accordance with Standard Specifications Section 107.
- Repair fluid leaks immediately.
- Provide impermeable spill containment dikes or secondary containment around stored oil and chemical drums.
- Vehicle and equipment maintenance areas, and storage areas for new and used products, shall be inspected weekly.
- Vehicles, equipment, and storage containers shall be inspected on each day of use. Leaks shall be repaired immediately or the vehicle, equipment, or container shall be removed from the project site or replaced.
- Inspect equipment for damaged hoses and leaky gaskets on each day of use. Repair or replace as needed.



# Pile Driving and Drilling Operations

**NS-11**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose	The construction and retrofit of bridges and retaining walls sometimes includes driving piles for foundation support and shoring operations. Driven piles are typically constructed of concrete, steel, or timber. Driven sheet piles are used for shoring and cofferdam construction. Proper control and use of equipment, materials, and waste products from pile driving operations will reduce the discharge of potential pollutants to the storm drain system or watercourses.
Appropriate Applications	These procedures apply to construction sites near or adjacent to a watercourse or groundwater where permanent and temporary pile driving operations (impact and vibratory) take place, including operations using pile shells for construction of cast-in-steel-shell and cast-in-drilled-hole drilled shaft piles.
Limitations	Drilled shafts often use drilling fluid.
Standards and Specifications	<ul style="list-style-type: none"><li>■ Use drip pans or absorbent pads during vehicle and equipment maintenance, cleaning, fueling, and storage. Refer to BMPs NS-9 "Vehicle and Equipment Fueling" and NS-10 "Vehicle and Equipment Maintenance."</li><li>■ Have spill kits and cleanup materials available at all locations of pile driving. Refer to BMP WM-4 "Spill Prevention and Control."</li><li>■ Keep equipment that is stored or in use in streambeds; or on docks, or other structures over water bodies, leak free.</li><li>■ Park equipment over plastic sheeting or equivalent where possible. Plastic sheeting is not a substitute for drip pans or absorbent pads.</li></ul>

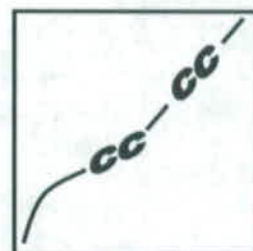
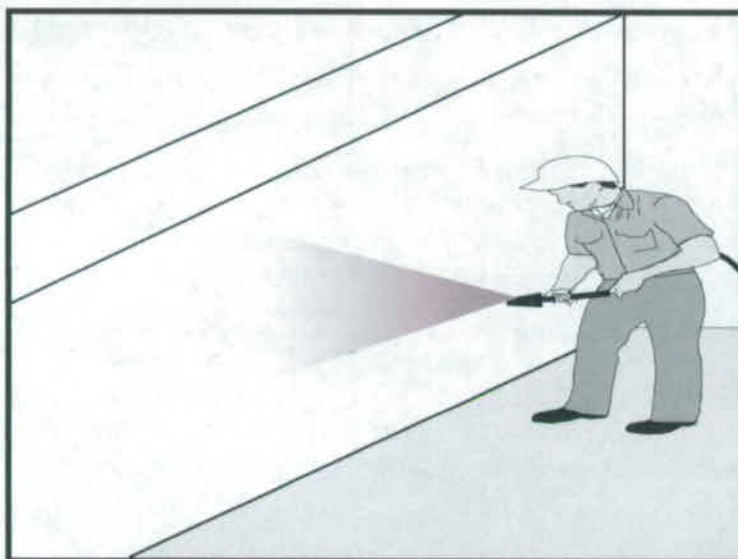
The storage or use of equipment in streambeds or other bodies of water shall comply with all applicable permits.

- Implement other BMPs as applicable, such as NS-2 "Dewatering Operations," WM-5 "Construction Debris and Litter Management," and WM-08 "Liquid Waste Management."
- When not in use, store pile driving equipment away from concentrated flows of storm water, drainage courses, and inlets. Protect hammers and other hydraulic attachments from run-on by placing them on plywood and covering them with plastic or a comparable material prior to the onset of rain.
- Inspect pile driving areas and equipment for leaks and spills on a daily basis.
- Inspect equipment routinely and repair equipment as needed (i.e., worn or damaged hoses, fittings, gaskets).

Maintenance and  
Inspection



Adapted from Caltrans Construction Site BMPs



### BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

**Definition and Purpose** Concrete and pavement curing is used in the construction of structures such as bridges, retaining walls, and pump houses. Concrete curing includes the use of both chemical and water methods. Proper procedures minimize pollution of runoff during concrete curing.

**Appropriate Applications** All concrete elements of a structure (i.e., footings, columns, abutments, stems, soffit, and deck) and concrete pavements are subject to curing requirements in accordance with Standard Specifications Section 501.

**Limitations** None identified.

### Standards and Specifications

#### Chemical Curing

- Avoid over-spray of curing compounds.
- Minimize the drift of chemical cure as much as possible by applying the curing compound close to the concrete surface. Apply an amount of compound that covers the surface, but does not allow any runoff of the compound.
- Use proper storage and handling techniques for concrete curing compounds. Refer to BMP WM-1 "Material Delivery and Storage."
- Protect drain inlets prior to the application of curing compounds. Refer to BMP SC-08 "Storm Drain Inlet Protection."
- Refer to WM-4 "Spill Prevention and Control."

***Water Curing for Bridge Decks, Retaining Walls, and other Structures***

- Direct cure water away from inlets and watercourses to collection areas for disposal in accordance with all applicable permits.
- When practical, collect cure water and transport or dispose of water in a non-erodible manner. See BMPs SS-9 "Earth Dikes/Drainage Swales & Lined Ditches," SS-10 "Outlet Protection/Velocity Dissipation Devices," and SS-11 "Slope Drains."
- Utilize wet blankets or a similar method that maintains moisture while minimizing the use and possible discharge of water.
- Ensure that employees and subcontractors implement appropriate measures for storage, handling, and use of curing compounds.
- Inspect any temporary diversion devices, lined channels, or swales for washouts, erosion, or debris. Replace lining and remove debris as necessary.
- Inspect cure containers and spraying equipment for leaks.

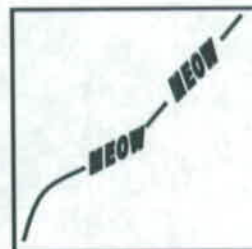
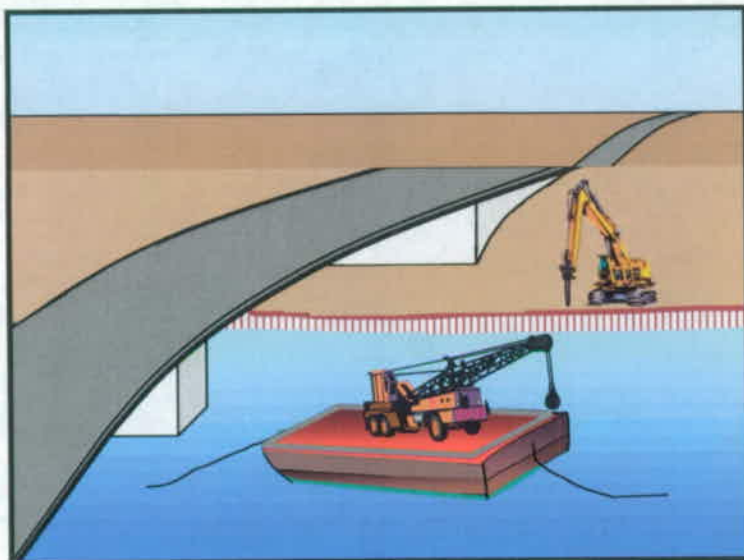
**Maintenance and  
Inspection**



# Material and Equipment Use Over Water

**NS-13**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose	Procedures for the proper use, storage, and disposal of materials and equipment on barges, boats, temporary construction pads, or similar locations that minimize or eliminate the discharge of potential pollutants to a watercourse.
Appropriate Applications	These procedures shall be implemented for construction materials and wastes (solid and liquid) and any other materials that may be detrimental if released. Applies where materials and equipment are used on barges, boats, docks, and other platforms over or adjacent to a watercourse.
Limitations	None identified.
Standards and Specifications	<ul style="list-style-type: none"><li>■ Refer to BMPs WM-1 "Material Delivery and Storage" and WM-4 "Spill Prevention and Control" and review the project's "Temporary Work in Waterways/Discharge Permit" for specific equipment maintenance requirements.</li><li>■ Use drip pans and absorbent materials for equipment and vehicles and ensure that an adequate supply of spill cleanup materials is available.</li><li>■ Drip pans shall be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is expected to be idle for more than one hour.</li><li>■ Maintain equipment in accordance with BMP NS-10 "Vehicle and Equipment Maintenance." If a leaking line cannot be repaired, remove equipment from over the water.</li><li>■ Provide watertight curbs or toe boards to contain spills and prevent</li></ul>

# Material and Equipment Use Over Water

Adapted from Caltrans Construction Site BMPs

materials, tools, and debris from leaving the barge, platform, dock, etc.

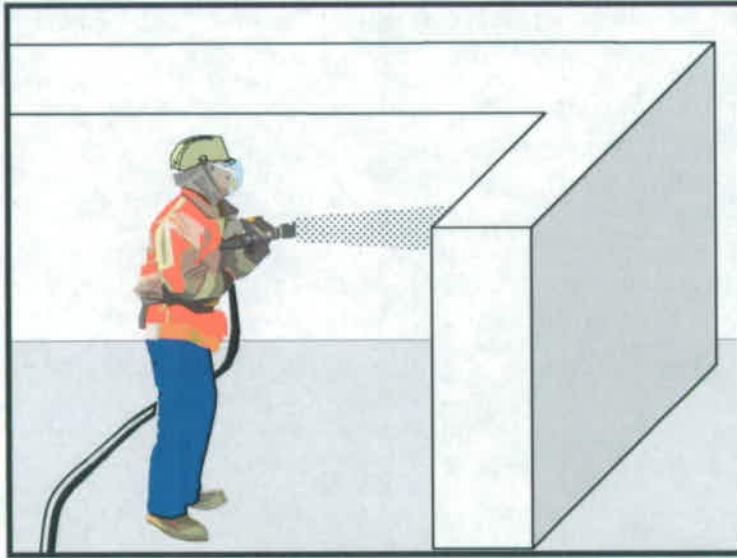
- Secure all materials to prevent discharges to receiving waters via wind.
- Identify types of spill control measures to be employed, including the storage of such materials and equipment. Ensure that staff is trained regarding the deployment and access of control measures and those measures are being used.
- Ensure the timely and proper removal of accumulated wastes.
- Refer to BMPs WM-5 "Construction Debris and Litter Management" (non-hazardous) and Standard Specification Section 107.
- Comply with all necessary permits required for construction within or near the watercourse, such as Nevada Division of State Lands, U.S. Army Corps of Engineers, NDEP, and other local permitting agencies.
- Refer to BMP NS-15 "Structure Demolition/Removal Over or Adjacent to Water."

## Maintenance and Inspection

- Inspect equipment for leaks and spills on a daily basis, and make necessary repairs.
- Ensure that employees and subcontractors implement appropriate measures for storage and use of materials and equipment.
- Inspect and maintain all associated BMPs and perimeter controls to ensure continuous protection of the watercourse.



Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

**Definition and Purpose** Concrete finishing methods are used for bridge deck rehabilitation; sound walls, paint removal, curing compound removal, and final surface finish appearances. Methods include sand blasting, shot blasting, grinding, or high pressure water blasting. Proper procedures minimize the impact that concrete-finishing methods may have on runoff.

**Appropriate Applications** These procedures apply to all construction locations where concrete finishing operations are performed.

**Limitations** Specific permit requirements may be included in the contract documents for certain concrete finishing operations.

- Standards and Specifications**
- Follow containment requirements stated in the project special provisions, if any.
  - Collect and properly dispose of water and solid waste from high-pressure water blasting operations.
  - Collect water from blasting operations and transport or dispose of water in a non-erodible manner. Refer to BMPs SS-9 "Earth Dikes/Drainage Swales & Lined Ditches," SS-10 "Outlet Protection/Velocity Dissipation Devices," and SS-11 "Slope Drains."
  - Direct water from blasting operations away from inlets and watercourses to collection areas for infiltration or other means of removal (dewatering) in accordance with applicable permits.
  - Protect inlets during sandblasting operations. Refer to BMP SC-08 "Storm Drain Inlet Protection."
  - Refer to BMP WM-06 "Concrete Waste Management."

**Maintenance and  
Inspection**

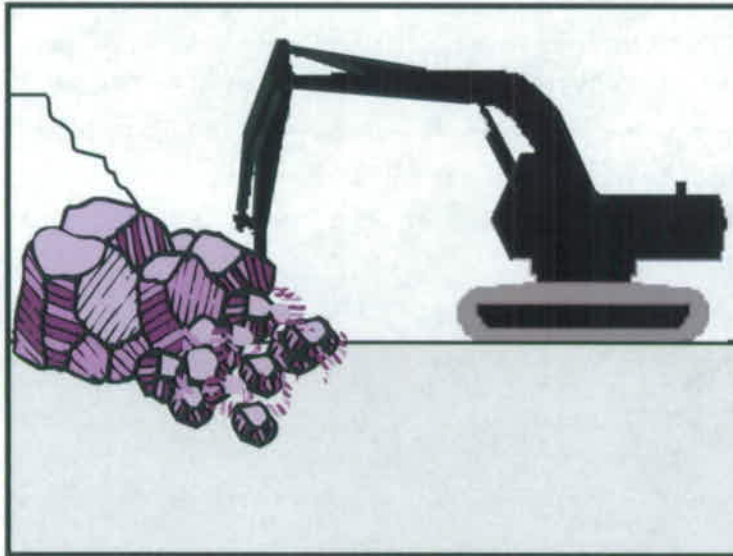
- Minimize the drift of dust and blast material as much as possible by keeping the blasting nozzle close to the surface.
- When blast residue contains potentially hazardous waste, refer to Standard Specification Section 107.
- Follow inspection procedure as required in the project special provisions.
- At a minimum, inspect containment structures, if any, for damage or voids prior to use each day and prior to the onset of rain.
- At the end of each work shift, remove and contain the liquid and solid wastes from containment structures, if any, and from the general work area.



# Structure Demolition/Removal Over or Adjacent to Water

**NS-15**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

### Definition and Purpose

Procedures to protect water bodies from debris and wastes associated with structure demolition or removal over or adjacent to watercourses.

### Appropriate Applications

Full bridge demolition and removal, partial bridge removal (barrier rail, edge of deck) associated with bridge widening projects, concrete channel removal, or any other structure removal that could potentially affect water quality.

### Limitations

Specific permit requirements may be included in the contract documents.

### Standards and Specifications

- Do not allow demolished material to enter waterway.
- Refer to BMP NS-5 "Clear Water Diversion" to direct water away from work areas.
- Use attachments on construction equipment such as backhoes to catch debris from small demolition operations.
- Use covers or platforms to collect debris. NDOT may require that a Licensed Engineer design these structures.
- Stockpile accumulated debris and waste generated during demolition away from watercourses and in accordance with BMP WM-3 "Stockpile Management."
- Ensure safe passage for wildlife.
- Contractors are responsible for reporting any discharges to a waterway immediately upon discovery to the Engineer. The Engineer will then report the discharge to the NDOT Water Quality

## **Structure Demolition/Removal Over or Adjacent to Water**

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Adapted from Caltrans Construction Site BMPs

Specialist. If determined necessary by NDOT, written notification from the Contractor describing the discharge may also be required.

### **Maintenance and Inspection**

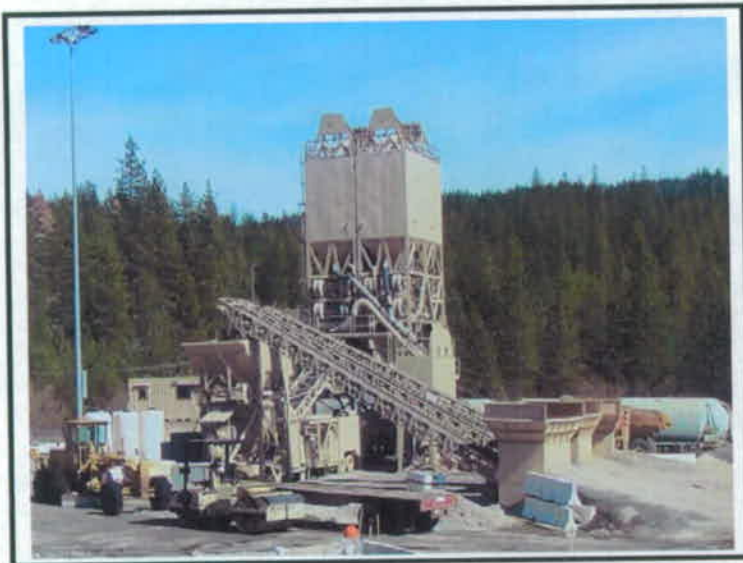
- For structures containing hazardous materials, (i.e., lead paint or asbestos) refer to Standard Specification Section 107.
- Contractor must inspect demolition areas over or near adjacent watercourses on a daily basis.
- Any debris-catching devices shall be emptied regularly. Collected debris shall be removed and stored away from the watercourse and protected from run-on and runoff.



# Temporary Batch Plants

NS-16

Adapted from Caltrans Construction Site BMPs



Standard Symbol

## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

## Definition and Purpose

The construction of roads, bridges and retaining walls often requires temporary batch plant facilities to crush rock, manufacture asphalt concrete (AC) or Portland cement concrete (PCC) near construction projects. Temporary batch plant facilities typically consist of silos containing fly ash, lime and cement; sand and gravel material storage areas; a mixing plant/equipment; above ground storage tanks containing concrete additives and water; and designated areas for sand and gravel truck unloading, concrete truck loading, and concrete truck washout. Proper control and use of equipment, materials, and waste products from temporary batch plant facilities will reduce the discharge of potential pollutants to the storm drain system or watercourses, reduce air emissions, and mitigate noise impacts.

Temporary concrete, asphalt, and material plants or operations require coverage under the General Permit. If the plant or operation is dedicated to a permitted construction project, the permit covers storm water discharge. However, a separate SWPPP must be prepared to address storm water controls specific to the plant or operations. The BMPs presented in this fact sheet offer guidelines for complying with the permit requirements. Other methods may also be available.

## Appropriate Applications

These procedures typically apply to onsite and offsite construction sites where temporary batch plant facilities are used.

## Limitations

- Specific permit requirements by Clark and Washoe Counties, NDEP and local noise ordinances, may be included in contract documents because of air emissions, storm and non-storm water discharges, and/or noise.

**Standards and  
Specifications****Planning**

- Temporary Batch Plants dedicated to a construction project are covered by the General Permit for Storm Water Discharges Associated with Construction Activity (General Permit). However, a separate Storm Water Pollution Prevention Plan must be prepared to address storm water control for the temporary batch plant. If the temporary batch plant serves multiple projects, then permit coverage must be obtained under the General Permit.
- Proper planning, design, and construction of temporary batch plants should be implemented to minimize potential water quality, air pollution, and noise impacts associated with temporary batch plants.
- Construct temporary batch plants down-wind of existing developments whenever possible.
- Placement of access roads should be planned to minimize water and air quality impacts.

**Layout and Design**

- Temporary batch plants should be properly located and designed to minimize water quality impacts to receiving water bodies. Batch plants should be located away from watercourses, drainage courses, and drain inlets. Batch plants should be located to minimize the potential for storm water run-on to the site.
- Temporary batch plant facilities (including associated stationary equipment and stockpiles) should be located at least 300 feet from any recreational area, school, residence, or other structure not associated with the construction project.
- Continuous interior AC or PCC berms around batch plant equipment (mixing equipment, silos, concrete drop points, conveyor belts, admixture tanks, etc.) can facilitate proper containment and cleanup of releases. Rolled curb or dikes should be placed at ingress and egress points, and loading areas.
- Direct storm water and non-storm water runoff from paved or unpaved portions of the batch plant facility to catchment ponds, tanks, or a lined washout area or baker tank.
- Construct and remove concrete washout facilities in accordance with Concrete Waste Management (WM-06).

**Operational Procedures**

- Washout of concrete trucks should be conducted in a designated area in accordance with Concrete Waste Management (WM-06).



- Do not dispose of concrete into drain inlets, the storm water drainage system or watercourses.
- Washing equipment, tools, or vehicles to remove PCC shall be conducted in accordance with Potable Water/Irrigation (NS-7) and Vehicle and Equipment Cleaning (NS-8) and Concrete Waste Management (WM-6).

There should be no visible emissions beyond the boundary (or perimeter) of the property on which the equipment is being operated. The following procedures should be considered if visible emissions are occurring and require abatement.

- All dry material transfer points should be ducted through cartridge type filter unless there are no visible emissions from the transfer point.
- Equip all bulk storage silos, including auxiliary bulk storage trailers, with fabric or cartridge type filter(s).
- Maintain silo vent filters in proper operating condition.
- Equip silos and auxiliary bulk storage trailers with a visible and/or audible warning mechanism to warn operators that the silo or trailer is full.
- Equip silos and auxiliary bulk storage trailers with dust-tight service hatches.
- Fabric dust collection system should be capable of controlling particulate matter in compliance with the project's Air Quality Permit.
- Fabric dust collectors (except for vent filters) should be equipped with an operational pressure differential gauge to measure the pressure drop across the filters.
- All transfer points should be equipped with a wet suppression system to control fugitive particulate emissions unless there are no visible emissions.
- All conveyors should be covered or equipped with spray systems, unless the material being transferred results in no visible emissions.
- Collect dust emissions from the loading of open-bodied trucks at the drip point of dry batch plants, or dust emissions from the drum feed for central mix plants.
- All open-bodied vehicles transporting unmixed, unconsolidated, or dry material should be sprayed with water, loaded with a final layer of wet sand or covered with a tarp to reduce emissions.

***Tracking Control***

- Plant roads (batch truck and material delivery truck roads) and areas between stockpiles and conveyor hoppers should be stabilized (TC-2), watered (SS-13), treated with dust-palliative, or paved with a cohesive hard surface that can be repeatedly swept, washed, and maintained intact and cleaned as necessary to control dust emissions.
- Trucks should not track PCC from plants onto the NDOT right of way or other public roads. Use appropriate practices from Stabilized Construction Entrance/Exit (TC-1) to prevent tracking.

***Materials Storage***

- Material Delivery and Storage (WM-1) should be implemented at all batch plants using concrete components or compounds. An effective strategy is to cover and contain.
- Material Use (WM-2) should be conducted in a way to minimize or eliminate the discharge of materials to storm drain system or watercourse.
- Minimize dispersion of finer materials into the air during operations, such as unloading cement delivery trucks.
- Stockpiles should be covered and enclosed with perimeter sediment barriers per Stockpile Management (WM-3). Uncovered stockpiles should be sprinkled with water and/or dust-palliative as necessary to control dust emissions, unless the stockpiled material results in no visible emissions per Standard Specifications Section 501. An operable stockpile water system should be onsite at all times.
- Store bagged and boxed materials on pallets and cover on non-working days or prior to rain.
- Provide secondary containment for liquid materials (WM-1) per CFR (Code of Federal Regulations) Sections 110, 117, and 302. Containment should provide sufficient volume to contain precipitation from a 24-hour 25-year storm plus 10% of the aggregate volume of all containers or plus 100% of the largest container, whichever is greater.
- Handle solid and liquid waste in accordance with Construction Debris and Litter Management (WM-5), Liquid Waste Management (WM-08), and Concrete Waste Management (WM-06).
- Immediately clean up spilled cement and fly ash and contain or dampen so that dust or emissions from wind erosion or vehicle traffic are minimized.



# Temporary Batch Plants

**NS-16**

Adapted from Caltrans Construction Site BMPs

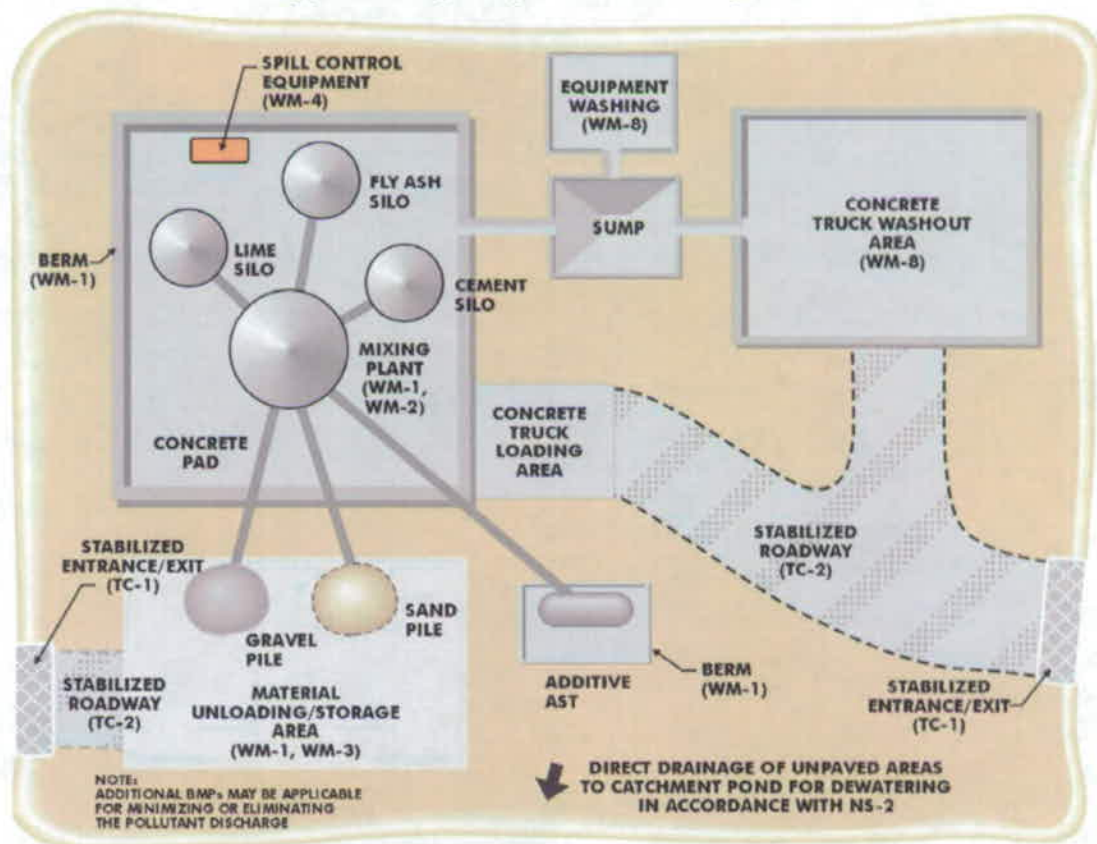
## Equipment Maintenance

- Equipment should be maintained to prevent fluid leaks and spills per Vehicle and Equipment Fueling (NS-9) and Vehicle and Equipment Maintenance (NS-10).
- Maintain adequate supplies of spill cleanup materials and train staff to respond to spills per Spill Prevention and Control (WM-4).
- Incorporate other BMPs such as Construction Debris and Litter Management (WM-5) and Liquid Waste Management (WM-08).

## Maintenance and Inspection

- Inspect batch plant components daily during batch plant construction and operation.
- Inspect and repair equipment (for damaged hoses, fittings, and gaskets).
- Inspect and maintain Stabilized Construction Entrance/Exit (TC-1) as needed.

## Typical Temporary Batch Plant Layout



# **Section 7**

## **Waste Management and Materials Pollution Control Best Management Practices**

### **7.1 Definitions**

Waste management and materials pollution control best management practices (BMPs), like non-storm water management BMPs, are source control BMPs that prevent pollution by limiting or reducing potential pollutants at their source before they come in contact with storm water. These BMPs also involve day-to-day operations of the construction site and are under the control of the Contractor, and are additional "good housekeeping practices", which involve keeping a clean, orderly construction site.

These BMPs are intended to prevent the release of waste materials to receiving waters through storm water runoff. They do not cover all regulations related to waste handling. It is imperative that all contractors and other users of this manual are also knowledgeable of, and follow, all federal, state and local regulations related to waste handling.

#### **7.1.1 Waste Management BMPs**

Waste management consists of implementing procedural and structural BMPs for handling, storing, and disposing of wastes generated by a construction project to prevent the release of waste materials into storm water discharges. Waste management includes the following BMPs:

- Spill Prevention and Control
- Construction Debris and Litter Management
- Concrete Waste Management
- Sanitary/Septic Waste Management
- Liquid Waste Management

#### **7.1.2 Materials Pollution Control BMPs**

Materials pollution control (also called materials handling) consists of implementing procedural and structural BMPs for handling, storing, and using construction materials to prevent the release of those materials into storm water discharges. The objective is to reduce the opportunity for rainfall to come in contact with these materials. These controls shall be implemented for all applicable activities, material usage and site conditions. Materials handling practices include the following BMPs:



*Section 7*  
*Waste Management and Materials Pollution Control Best Management Practices*

- Material Delivery, and Storage
- Material Use
- Stockpile Management

Table 7-1 lists the waste management and materials pollution control BMPs. It is important to note that all these BMPs have been approved by NDOT for statewide use and they shall be implemented depending on the conditions/applicability of deployment described as part of the BMP.

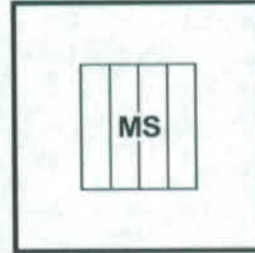
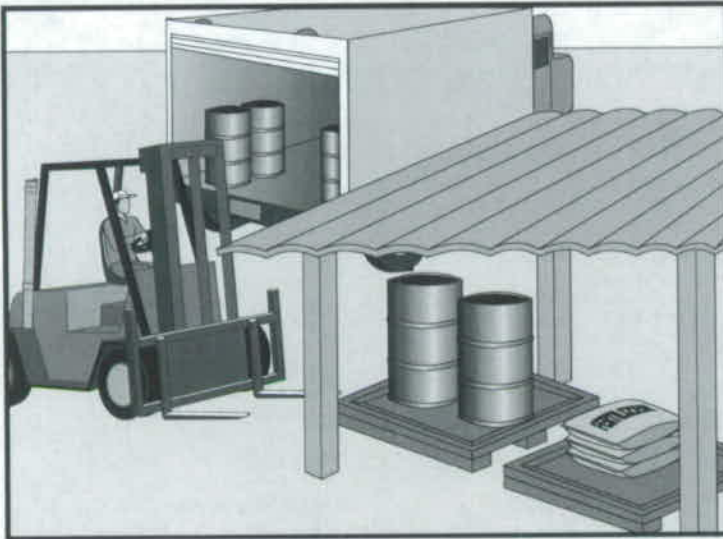
Table 7-1 WASTE MANAGEMENT AND MATERIALS POLLUTION CONTROL BMPs	
ID	BMP NAME
WM-1	Material Delivery and Storage
WM-2	Material Use
WM-3	Stockpile Management
WM-4	Spill Prevention and Control
WM-5	Construction Debris and Litter Management
WM-6	Concrete Waste Management
WM-7	Sanitary/Septic Waste Management
WM-8	Liquid Waste Management

The remainder of this Section shows the working details for each of the waste management and materials pollution control BMPs.

# Material Delivery and Storage

**WM-1**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

**Definition and Purpose** Procedures and practices for the proper handling and storage of materials in a manner that minimizes or eliminates the discharge of these materials to the storm drain system or to watercourses.

**Appropriate Applications** These procedures are implemented at all construction sites with delivery and storage of the following:

- Pesticides and herbicides (see QPL 401)
- Soil stabilizers and binders (see QPL 726)
- Fertilizers (see QPL 726)
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease
- Asphalt and concrete related compounds (see QPL 401, 496 and 609)
- Solid or liquid materials that may contain hazardous substances
- Other materials that may be released to the environment

**Limitations**

- Space limitation may preclude indoor storage.
- Storage sheds must meet building & fire code requirements.



## Standards and Specifications

### *General*

- Train employees and subcontractors on the proper material delivery and storage practices.
- Materials storage areas should be designated per the contract documents and must comply with all federal, state, and local regulations. Storage areas should be located away from vehicular traffic.
- Material Safety Data Sheets (MSDS) shall be available on site for all materials stored.
- Secure storage areas with fencing, locked sheds or trailers to prevent unwarranted access.

### *Material Storage Areas and Practices*

- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 shall be stored in appropriate containers and drums and shall not be overfilled. Containers and drums shall be placed in temporary containment facilities for storage.
- A temporary containment facility shall provide sufficient spill containment volume to contain precipitation from a 24-hour, 2-year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest container within its boundary, whichever is greater.
- A temporary containment facility shall be impervious to the materials stored therein for a minimum contact time of 72 hours and its integrity inspected daily.
- A temporary containment facility shall be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills shall be collected and placed into DOT approved drums. Handle and dispose of these liquids in accordance with applicable federal, state, or local laws.
- Allow access in storage areas for spill cleanup and emergency response access.
- Incompatible materials shall not be stored in the same temporary containment facility.
- Each temporary containment facility shall be covered.
- Materials shall be stored in their original containers and the original product labels shall be maintained in place in a legible condition. Damaged or otherwise illegible labels shall be replaced immediately.

# Material Delivery and Storage

**WM-1**

Adapted from Caltrans Construction Site BMPs

- Bagged and boxed materials shall be stored on pallets off of the ground and covered to provide protection from wind and rain.
- Stockpiles shall be protected in accordance with BMP WM-3, "Stockpile Management".
- Store materials indoors within existing structures or sheds. A storage facility having a solid cover and sides is preferred to a temporary tarp. Storage facilities shall be equipped with proper ventilation.
- Have proper storage instructions posted at all times in an open and conspicuous location.
- Do not store hazardous chemicals, drums, or bagged materials directly on the ground. When not in use, store these items on a pallet, under cover in secondary containment.
- Appropriate spill clean up material shall be readily identified and placed near storage areas.

## ***Material Delivery Practices***

- Keep an accurate, up-to-date inventory of material delivered and stored on-site.
- Personnel appropriately trained emergency spill clean-up procedures shall be present when solid or liquid-hazardous materials are unloaded.

## ***Spill Clean-up***

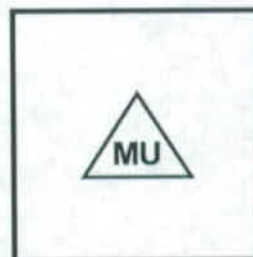
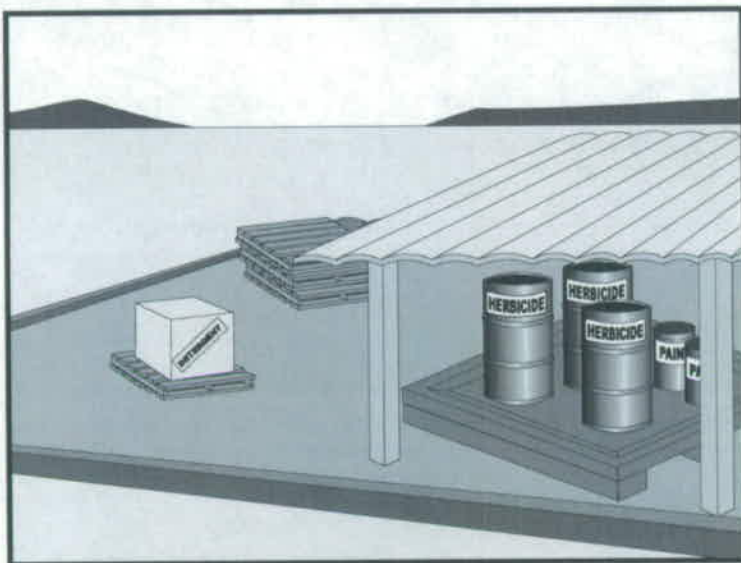
- Contain and clean up any spilled immediately.
- Properly remove and dispose of any spilled hazardous materials in accordance with federal, state, or local laws.
- See BMP WM-4, "Spill Prevention and Control", for spills of chemicals and/or hazardous materials.

## **Maintenance and Inspection**

- Storage areas shall be kept clean, well organized, and equipped with sufficient clean-up supplies as appropriate for the materials being stored.
- Perimeter controls, containment structures, covers, and liners shall be repaired or replaced as needed to maintain proper function.
- Inspect storage areas before and after rainfall events, and daily during other times.



Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

**Definition and Purpose** These are procedures and practices for use of construction material in a manner that minimizes or eliminates the discharge of these materials to the storm drain system or to watercourses.

**Appropriate Applications** This BMP applies to all construction projects. These procedures apply when the following materials are used or prepared on site:

- Pesticides and herbicides (see QPL 401)
- Fertilizers (see QPL 726)
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease
- Asphalt and other concrete related compounds (see QPL 401, 496 and 609)
- Solid or liquid materials that may contain hazardous substances (see QPL 633, 728 and 729)
- Other materials that may be to the environment

**Limitations** ■ Safer alternative building and construction products may not be available or suitable in every instance.

**Standards and Specifications**

- Material Safety Data Sheets (MSDS) for all materials shall be readily available on site.
- Do not remove the original product label; it contains important safety and disposal information. Use the entire product before disposing of the container.
- Never clean paintbrushes or rinse paint containers into a street, gutter, storm drain or watercourse. Dispose of any paint thinners, residue and sludge(s), that cannot be recycled, in accordance with Standard Specifications Section 107.
- For water-based paint, clean brushes to the extent practical, and rinse to a drain leading to a sanitary sewer where permitted, or into a concrete washout pit or other containment. For oil-based paints, clean brushes to the extent practical and filter and reuse thinners and solvents.
- Use recycled and alternative products free of hazardous materials (source reduction) when practical. Recycle residual paints, solvents, non-treated lumber, and other materials (waste minimization).
- Fertilizers and pesticides (e.g. herbicides and insecticides) shall be applied per manufacturer's instructions and in compliance with any applicable laws and regulations.
- Application of pesticides shall be performed by a State of Nevada licensed applicator.
- Allow sufficient drying or application time to avoid exposing uncured applied materials to rainfall and runoff.

**Maintenance and Inspections**

- Periodically and regularly inspect employees and subcontractors throughout the duration of the project to ensure appropriate practices are being employed.



# Stockpile Management

**WM-3**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

**Definition and Purpose** Stockpile management procedures and practices are designed to reduce or eliminate air and storm water pollution from stockpiles of soil, and paving materials such as portland cement, aggregate sub-base or pre-mixed aggregate and pressure treated wood.

**Appropriate Applications** Implemented in all projects that stockpile soil and other materials that contain fine particles or other materials that have the potential to release into storm water runoff.

**Limitations** None identified

- Standards and Specifications**
- Protection of stockpiles is a year-round requirement.
  - Locate stockpiles a minimum of 100 ft. away from concentrated flows of storm water, drainage courses, and inlets wherever possible. See Standard Specification Section 107 for additional information.
  - Protect stockpiles from storm water run-on using a temporary perimeter sediment barrier such as berms, dikes, fiber rolls, gravel bag berm, silt fences or sandbag.
  - Implement wind erosion control practices, as appropriate, on all stockpiled material. For specific information see BMP SS-13, "Wind Erosion Control."
  - Stockpiles of soil should be managed in accordance with Standard Specification Section 107.
  - Bagged materials should be placed and stored in a manner consistent with BMP WM-1, "Material Delivery and Storage".

## ***Protection of Non-Active Stockpiles***

Non-active stockpiles, defined as stockpiles not in use for two or more weeks, of the identified materials should be protected further as follows:

- ***Soil stockpiles:***
  - May not be applicable to pits, batch plants, or commercial sources.
  - Soil stockpiles should be covered or protected with soil stabilization measures (See SS fact sheets) and a temporary perimeter sediment barrier at all times.
- ***Stockpiles of Portland Cement aggregate base, or aggregate sub-base:***
  - Stockpiles should be covered or protected with a temporary perimeter sediment barrier at all times.
- ***Stockpiles/Storage of pressure treated wood with copper, chromium, and arsenic or ammonical, copper, zinc, and arsenate:***
  - Treated wood stockpiles should be placed on and covered with plastic or comparable material at all times.

## ***Protection of Active Stockpiles***

Active stockpiles of the identified materials should be protected further as follows:

### **Maintenance and Inspections**

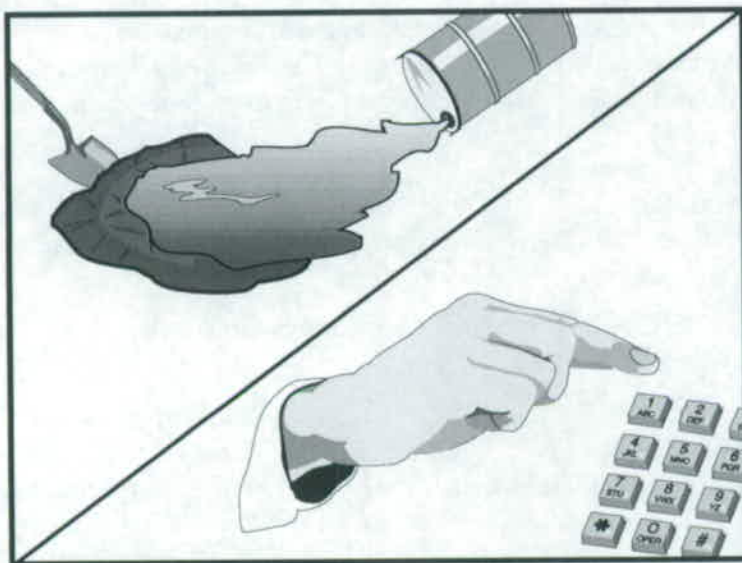
- Stockpiles should be covered, stabilized, or protected with a temporary linear sediment barrier prior to the onset of precipitation.
- Repair and/or replace perimeter controls and covers as needed, or as directed by the Resident Engineer (RE), to keep them functioning properly.



# Spill Prevention and Control

WM-4

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

**Definition and Purpose** These are procedures and practices implemented to prevent and control spills in a manner that minimizes or prevents the discharge of spilled material to the drainage system or watercourses.

**Appropriate Application** This BMP applies to all construction projects. Spill control procedures are implemented anytime solid or liquid materials that may contain hazardous chemicals are stored. Substances may include, but are not limited to:

- Soil stabilizers/binders
- Dust Palliatives
- Herbicides
- Growth inhibitors
- Fertilizers
- Deicing/anti-icing chemicals
- Fuels
- Lubricants
- Other petroleum distillates

To the extent that the work can be accomplished safely, spills of oil, petroleum products, substances listed under 40 CFR (Code of Federal Regulations) parts 110, 117, and 302, and sanitary and septic wastes shall be contained and cleaned up immediately either by onsite personnel (dependant on level of training), local agencies (e.g. fire department), or by engaging a private emergency response company, as necessary and determined herein.

- |                              |  |
|------------------------------|--|
| Limitations                  | <ul style="list-style-type: none"><li>■ Procedures and practices presented in this BMP are general. The Contractor must identify appropriate practices for the specific materials used or stored on-site and comply with all federal, state and local regulations.</li></ul>   |
| Standards and Specifications | <ul style="list-style-type: none"><li>■ To the extent that it does not compromise clean up activities, spills should be covered and protected from storm water run-on during rainfall.</li><li>■ Spills shall not be buried or washed with water, unless as part of emergency response activities.</li><li>■ Used clean up materials, materials impacted from the effect of a spill, and recovered product that is no longer suitable for the intended purpose shall be stored and disposed of in conformance with Standard Specifications Section 107.</li><li>■ Water used for cleaning and decontamination shall not be allowed to enter storm drains or watercourses and shall be collected and disposed of in accordance with BMP WM-08, "Liquid Waste Management".</li><li>■ Proper storage, clean-up and spill reporting instruction for hazardous materials stored or used on the project site shall be posted near the materials.</li><li>■ Waste storage areas shall be kept clean, well organized and equipped with ample clean-up supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers and liners shall be inspected daily and repaired or replaced as needed to maintain proper function.</li></ul> |

### **Education**

- Educate employees and subcontractors on what a "reportable spill" is for each material they use, and what is the appropriate response for "reportable" and "non-reportable" spills.
- Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.
- Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.
- The Contractor's Water Pollution Control Manager (WPCM) shall oversee and enforce proper spill prevention and control measures.



## ***Spill Classification, Reportable, and Non-Reportable Spills***

A spill can be described as any pollutant, hazardous waste or contaminate that has been spilled, leaked, pumped, poured, emitted, emptied, discharged, injected, escaped, leached, dumped, or disposed into the environment.

The reportable quantity for petroleum products such as oil, diesel, gasoline, and hydraulic fluid is 25 gallons or 3 cubic yards of impacted material, or the presence on or in groundwater.

The reportable quantity for hazardous waste is based upon Federal EPA guidelines established under Title III List of Lists (40CFR Part 302). A spill of any quantity that affects a waterway within the State of Nevada must be reported, regardless of the quantity.

Contact NDEP at 1-888-331-NDEP (6337) to report a Reportable Spill and NDOT's Environmental Division at (775) 888-7013 as soon as possible but no later than the end of the first working day of the release.

## ***Spill Clean up and Storage Procedures***

### ■ Non-Reportable Spills

- Non-reportable spills may be controlled by the first individual, adequately trained and with the responsibility to act, to arrive on the scene of the spill.
- Use absorbent materials on small spills rather than hosing down or burying the spill.
- Remove the absorbent materials promptly and dispose of properly in accordance with Standard Specifications Section 107.
- The practice commonly followed for a non-reportable spill is:
  1. Contain the spread of the spill.
  2. Recover spilled materials.
  3. Clean the impacted area and/or properly dispose of affected materials.

### ■ Petroleum Product Reportable Spills

- Petroleum Product Reportable spills may be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, dependent on level of training. This response may require the cessation of all other activities.

- Clean up spills immediately:
  1. Contain spread of the spill.
  2. If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.
  3. If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike.
  4. If the spill occurs during rain, cover spill with tarps or other material to prevent impacting runoff.
  5. Notify the NDOT Resident Engineer immediately and follow up with a written report.
  6. Notify NDEP and contact NDOT Environmental Services Division.
- Hazardous Material Reportable Spills
  - For hazardous Material Reportable Spills that cannot be controlled by appropriately trained personnel in the immediate vicinity, the following steps shall be taken:
    1. Notify the local emergency response by dialing 911, as necessary. In addition to 911, the contractor will notify the NDOT Resident Engineer, NDOT Environmental Services Division, the NDEP and the appropriate federal agencies. It is the contractor's responsibility to have all emergency phone numbers at the construction site.
    2. The services of a spills contractor or HazMat team shall be obtained immediately. Construction personnel shall not attempt to clean up the spill.
    3. Notification shall first be made by telephone and followed up with a written report.
    4. Other agencies which may need to be consulted include, but are not limited to, the Fire Department, the Public Works Department, the Highway Patrol, the City/County Police Department, Department of Toxic Substances, Nevada Division of Oil and Gas, OSHA, etc.



# Spill Prevention and Control

**WM-4**

Adapted from Caltrans Construction Site BMPs

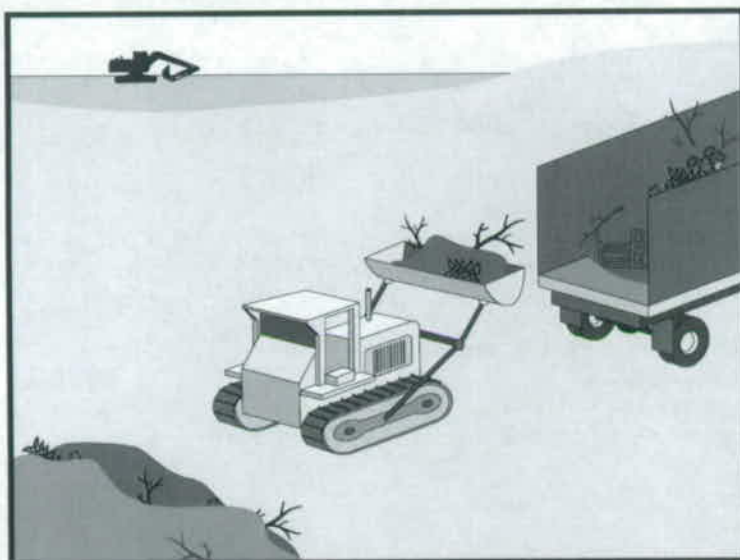
## Maintenance and Inspection

- Verify weekly that spill control clean up materials are properly identified and are located near material storage, unloading, and use areas.
- Update spill prevention and control plans and stock appropriate clean-up materials whenever changes occur in the types of chemicals on site.

# Construction Debris and Litter Management

**WM-5**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose	Solid waste management procedures and practices are designed to minimize or eliminate the discharge to the drainage system or to watercourses as a result of the creation, stockpiling, or removal of construction site wastes.
Appropriate Applications	<p>Solid waste management procedures and practices are implemented on all construction projects that generate solid wastes. All disposal practices shall conform to the requirements of the Solid Waste Disposal Act (SWDA) as amended by the Resource Conservation and Recovery Act (RCRA).</p> <p>Solid wastes include but are not limited to:</p> <ul style="list-style-type: none"><li>■ Construction wastes including brick, mortar, timber, steel and metal scraps, sawdust, pipe and electrical cuttings, non-hazardous equipment parts, styrofoam and other materials used to transport and package construction materials.</li><li>■ Highway planting wastes, including vegetative material, plant containers, and packaging materials.</li><li>■ Litter, including food containers, beverage cans, coffee cups, paper bags, plastic wrappers, and smoking materials, including litter generated by the public.</li></ul> <p>This BMP is not intended to address hazardous or toxic materials.</p>
Limitations	Temporary stockpiling of certain construction wastes may not necessitate stringent drainage related controls during the non-rainy season or in desert areas with low rainfall.



# Construction Debris and Litter Management

Adapted from Caltrans Construction Site BMPs

## Standards and Specifications

### *Education*

- The Contractor's Water Pollution Control Manager (WPCM) shall oversee and enforce proper solid waste procedures and practices.
- Instruct employees and subcontractors on identification of solid waste and hazardous waste.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Require that employees, subcontractors, and visitors follow solid waste handling, storage, and disposal procedures.
- Wherever possible, minimize production of solid waste materials.

### *Collection, Storage, and Disposal*

- Littering on or off of the project site is prohibited per Nevada State Antilitter law.
- To prevent clogging of the storm drainage system litter and debris removal from drainage grates, trash racks, and ditch lines shall be a priority.
- Trash receptacles shall be provided in the Contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods.
- Construction debris and litter from work areas within the construction limits of the project site shall be collected and placed in watertight debris box (dumpsters) at least weekly regardless of whether the litter was generated by the Contractor, the public, or others. Collected litter and debris shall not be placed in or next to drain inlets, storm water drainage systems or watercourses.
- Watertight dumpsters of sufficient size and number shall be provided to contain the solid waste generated by the project and properly serviced.
- Full dumpsters shall be removed from the project site and the contents shall be disposed of outside the highway right of way in conformance with the provisions in Standard Specifications Section 107.
- Litter stored in collection areas and containers shall be handled and disposed of in accordance with Standard Specifications Section 107
- Construction debris and waste shall be removed from the site biweekly or as appropriate.

# Construction Debris and Litter Management

**WM-5**

Adapted from Caltrans Construction Site BMPs

- Construction material visible to the public shall be stored or stacked in an orderly manner to the satisfaction of the Engineer.
- Storm water run-on shall be prevented from contacting stored solid waste through the use of berms, dikes, or other temporary diversion structures or through the use of measures to elevate waste from site surfaces.
- Solid waste storage areas shall be located at least 45 ft. from drainage facilities and watercourses and shall not be located in areas prone to flooding or ponding.
- Construction and highway planting waste not stored in watertight dumpsters shall be securely covered from wind and rain by covering the waste with tarps or plastic sheeting or other appropriate BMPs.
- Dumpster washout on the project site is not allowed.
- Plan for additional containers during the demolition phase of construction.
- Plan for more frequent pickup during the demolition phase of construction.
- Construction waste shall be stored in a designated area.
- Segregate potentially hazardous waste from non-hazardous construction site waste.
- Keep the site clean of litter debris.
- Make sure that potentially hazardous liquid wastes (used oils, solvents, paints, acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Dispose of non-hazardous and hazardous waste in accordance with Standard Specifications Section 107.
- Salvage or recycle useful vegetation debris, packaging and/or surplus building materials when practical. For example, trees and shrubs from land clearing can be converted into wood chips, and then used as mulch on graded areas. Wood pallets, cardboard boxes, and construction scraps can also be recycled.

## Maintenance and Inspection

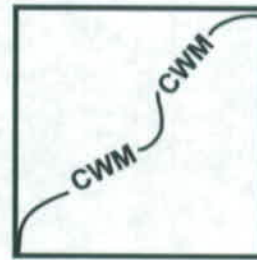
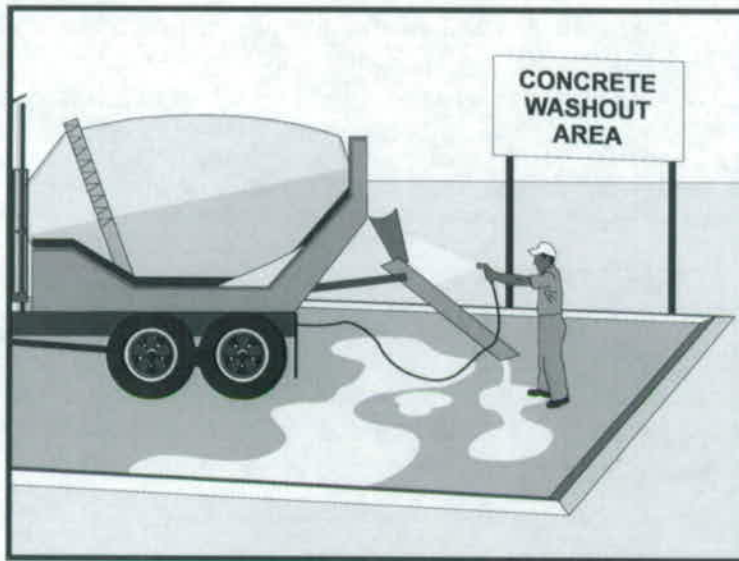
- The WPCM shall monitor on-site solid waste storage and disposal procedures.



# Concrete Waste Management

WM-6

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

### Definition and Purpose

These procedures and practices are designed to minimize or eliminate the discharge of concrete waste materials to the storm drain systems or to watercourses.

### Appropriate Applications

- Concrete waste management procedures and practices are implemented on construction projects where concrete is used as a construction material or where concrete dust and debris result from demolition activities.
- Where slurries containing portland cement concrete (PCC) or asphalt concrete (AC) are generated, such as from sawcutting, coring, grinding, grooving, and hydro-concrete demolition.
- Where concrete trucks and other concrete-coated equipment are washed on site. See also NS-8, Vehicle and Equipment Cleaning.
- Where mortar-mixing stations exist.

Limitations None identified.

### Standards and Specifications

#### Education

- Educate employees, subcontractors, and suppliers on the concrete waste management techniques described herein.
- The Contractor's Water Pollution Control Manager (WPCM) shall oversee and enforce concrete waste management procedures.

#### Concrete Slurry Wastes

- PCC and AC waste shall not be allowed to enter storm drains or watercourses.

- PCC and AC waste shall be collected and properly disposed of outside the highway right-of-way in conformance with Standard Specifications Section 107 or placed in a temporary concrete washout facility.
- Disposal of hardened PCC and AC waste shall be in conformance with Standard Specifications Sections 202 and 107.
- A sign shall be installed adjacent to each temporary concrete washout facility to inform concrete equipment operators to utilize the proper facilities.
- A foreman and/or construction supervisor shall monitor on-site concrete working tasks, such as saw cutting, coring, grinding and grooving to ensure proper methods are implemented.
- Do not allow saw-cut PCC slurry to enter storm drains or watercourses. Residue from grinding operations shall be picked up by means of a vacuum attachment to the grinding machine. Saw cutting residue shall not be allowed to flow across the pavement, and shall not be left on the surface of the pavement. See also BMP NS-3, "Paving and Grinding Operations"; and BMP WM-08, "Liquid Waste Management."
- Do not allow saw-cut PCC slurry to enter storm drains or watercourses. Residue from grinding operations shall be picked up by means of a vacuum attachment to the grinding machine or other appropriate means such as brooms, squeegees, shovels, etc. Saw cutting residue shall not be allowed to flow across the pavement, and shall not be left on the surface of the pavement. See also BMP NS-3, "Paving and Grinding Operations", and BMP WM-08, "Liquid Waste Management."
- Collect slurry residue and dispose in a temporary pit (as described in *On-Site Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures*, below) and allow slurry to dry. Dispose of dry slurry residue in accordance with BMP WM-5, "Construction Debris and Litter Management", or, for on-site disposal, in accordance with Standard Specifications Section 202.

### ***On-site Temporary Concrete Washout Facility, Transit Truck Washout Procedures***

- Temporary concrete washout facilities shall be located a minimum of 100 ft., where practical from storm drain inlets, open drainage facilities, and watercourses, unless determined unfeasible by the Engineer. Each facility shall be located away from construction traffic or access areas to prevent disturbance or tracking.



- A sign shall be installed adjacent to each washout facility to inform concrete equipment operators to utilize the proper facilities. The sign shall be installed as shown on the plans and in conformance with the provisions in Standard Specifications Section 625, "Construction Signs".
- Temporary concrete washout facilities shall be constructed above grade or below grade at the option of the Contractor. Temporary concrete washout facilities shall be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.
- Temporary washout facilities shall have a temporary pit or bermed areas of sufficient volume to completely contain all liquid and waste concrete materials generated during washout procedures.
- Perform washout of concrete trucks in designated areas only.
- Wash concrete only from mixer truck chutes into approved concrete wash out facility. Washout may be collected in an impermeable bag for disposal.
- Pump excess concrete pump bin back into concrete mixer truck.
- Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed offsite.
- Once concrete wastes are washed into the designated area and allowed to harden, the concrete shall be broken up, removed, and disposed of per BMP WM-5, "Construction Debris and Litter Management", and in conformance with the provisions in Standard Specifications Section 202.
- *Temporary Concrete Washout Facility (Type Above Grade)*
  - Temporary concrete washout facility (type above grade) shall be constructed as shown on the plans, with a recommended minimum length and minimum width of 10 ft., but with sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations. The length and width of a facility may be increased, at the Contractor's expense, upon approval of the Engineer.
  - Plastic lining material shall be a minimum of 10-mil polyethylene sheeting and shall be free of holes, tears or other defects that compromise the impermeability of the material.
  - The soil base shall be prepared free of rocks or other debris that may cause tears or holes in the plastic lining material.

- Plastic lining material shall be a minimum of 10-mil polyethylene sheeting and shall be free of holes, tears or other defects that compromise the impermeability of the material.

### ***Removal of Temporary Concrete Washout Facilities***

- Temporary concrete washout facilities shall be inspected for damage (i.e. tears in PVC liner, missing sandbags, etc.). Damage facilities shall be required.
- When temporary concrete washout facilities are no longer required for the work the hardened concrete shall be removed and disposed of in conformance with the provisions in Standard Specifications Section 202. Disposal of PCC slurries or liquid waste shall be disposed of outside the highway right-of-way in conformance with the provisions in Standard Specifications Section 107. Materials used to construct temporary concrete washout facilities shall become the property of the Contractor, shall be removed from the site of the work, and shall be disposed of outside the highway right-of-way in conformance with the provisions in Standard Specifications Section 107.
- Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities shall be backfilled and repaired in conformance with the provisions in Standard Specifications Section 107.

### **Maintenance and Inspection**

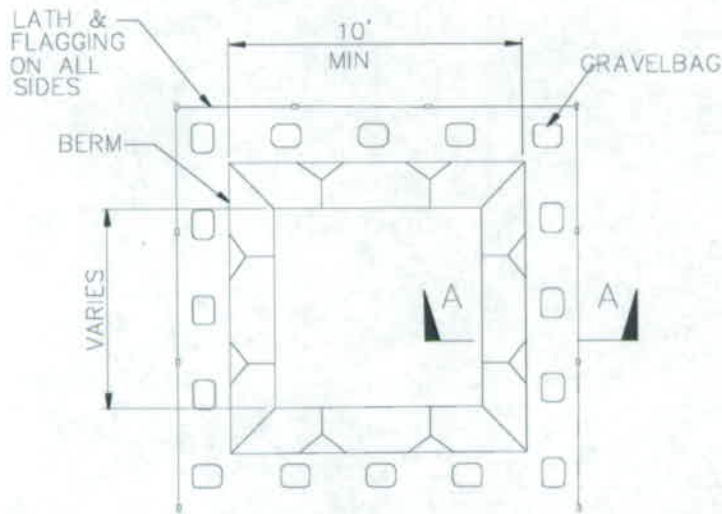
- The Contractor's Water Pollution Control Manager (WPCM) shall monitor on site concrete waste storage and disposal procedures at least weekly.
- The WPCM shall monitor concrete working tasks, such as saw cutting, coring, grinding and grooving daily to ensure proper methods are employed or as directed by the Engineer.
- Temporary concrete washout facilities shall be maintained to provide adequate holding capacity with a minimum freeboard of 4 in. for above grade facilities and 12 in. for below grade facilities. Maintaining temporary concrete washout facilities shall include removing and disposing of hardened concrete and returning the facilities to a functional condition. Hardened concrete materials shall be removed and disposed of in conformance with the provisions in Standard Specifications Section 202.
- Existing facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.



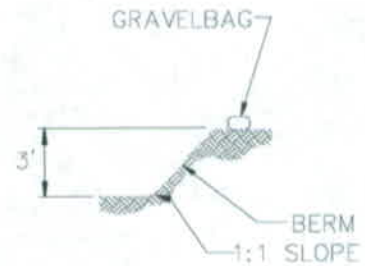
# Concrete Waste Management

**WM-6**

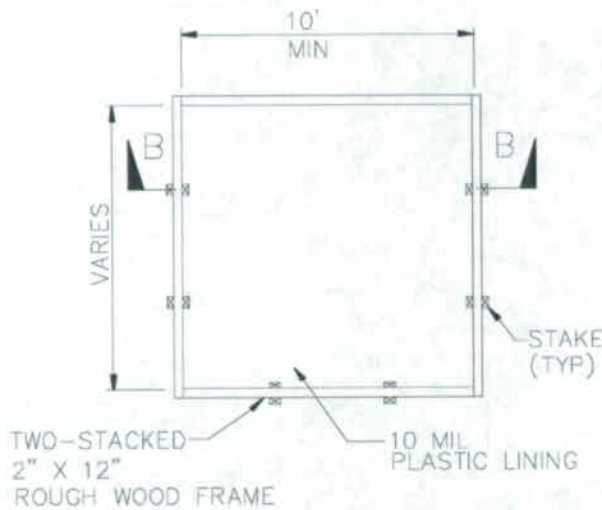
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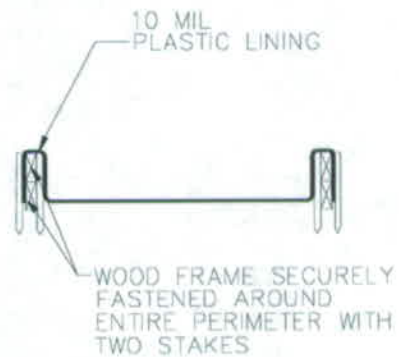
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SECTION A-A  
NOT TO SCALE



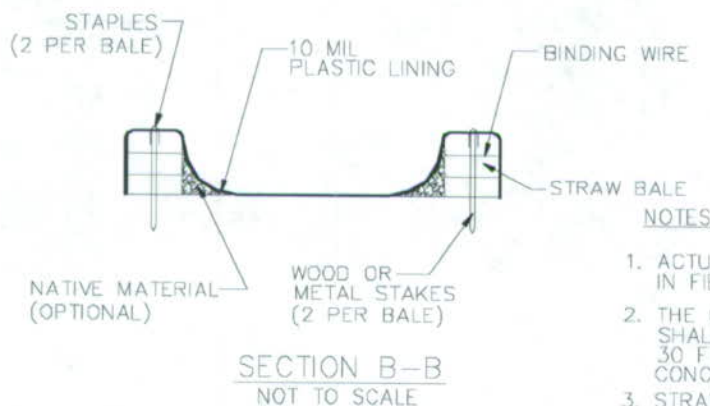
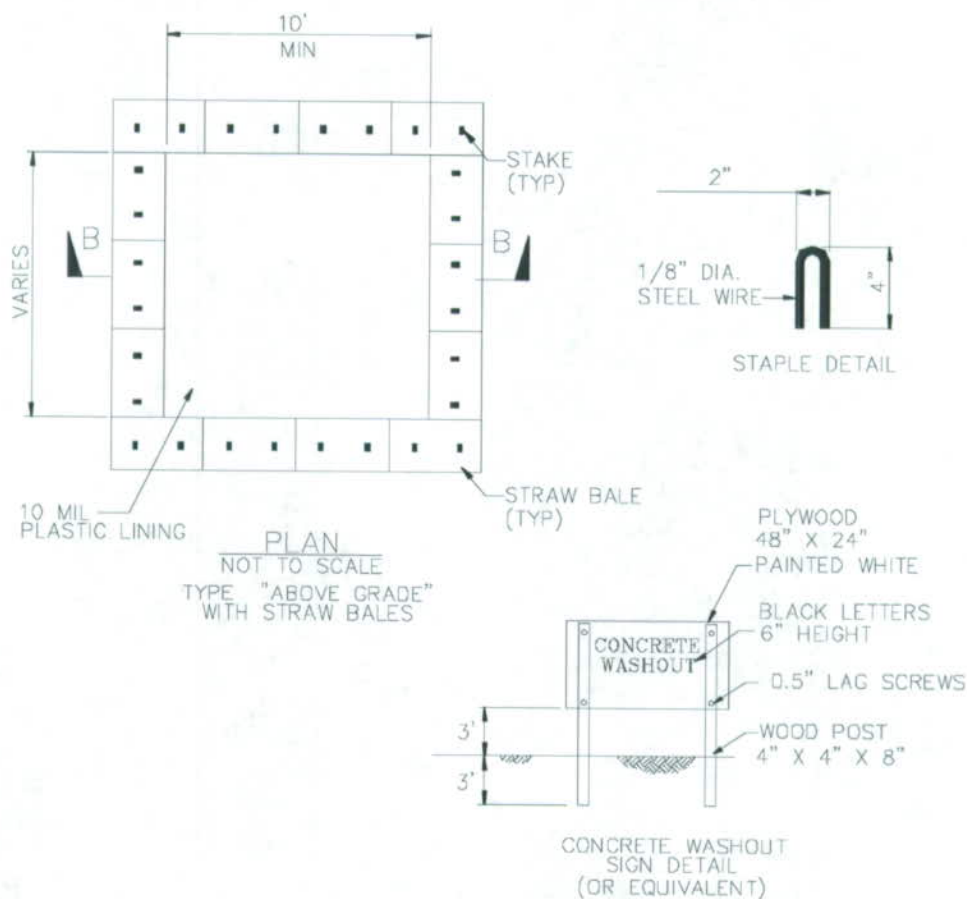
PLAN  
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TYPE "ABOVE GRADE"



SECTION B-B  
NOT TO SCALE

## NOTES

1. ACTUAL LAYOUT DETERMINED IN FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY.

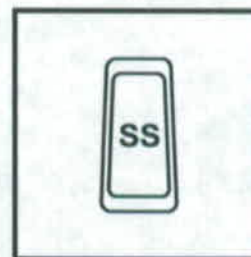
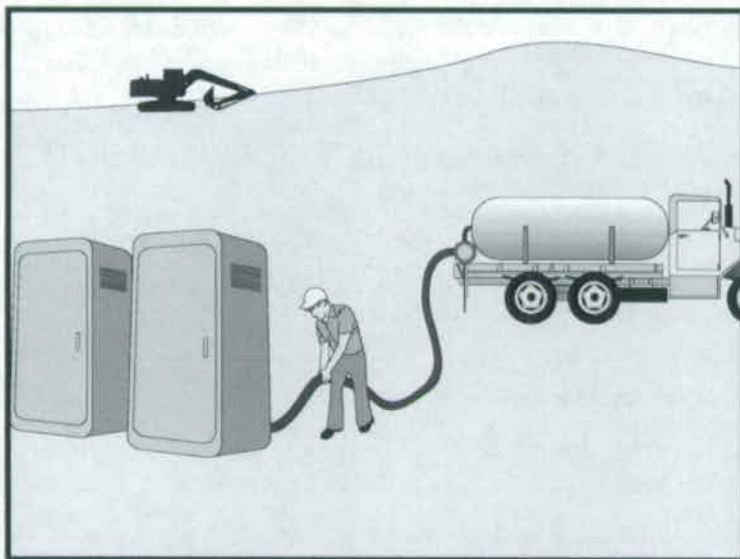


### NOTES

1. ACTUAL LAYOUT DETERMINED IN FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY.
3. STRAW BALE INTENDED FOR THIS APPLICATION ONLY



Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

**Definition and Purpose** Procedures and practices to minimize or eliminate the discharge of construction site sanitary/septic waste materials to the storm drain system or to watercourses.

**Appropriate Applications** Sanitary/septic waste management practices are implemented on all construction sites that use temporary or portable sanitary/septic waste systems.

**Limitations** Not applicable.

## Standards and Specifications

### Education

- Educate employees, subcontractors, and suppliers on sanitary/septic waste storage and disposal procedures.
- Educate employees, subcontractors, and suppliers of potential dangers to humans and the environment from sanitary/septic wastes.
- Instruct employees, subcontractors, and suppliers in identification of sanitary/septic waste.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.

### Storage and Disposal Procedures

- Temporary sanitary facilities shall be located as far away as practicable from drainage facilities given site conditions,

watercourses, and from traffic circulation. When subjected to high winds or risk of high winds, temporary sanitary facilities shall be secured to prevent overturning.

- Wastewater shall not be discharged or buried within the highway right-of-way.
- Sanitary and septic systems that discharge directly into sanitary sewer systems, where permissible, shall comply with the local health agency, city, county, and sewer district requirements.
- If using an on site disposal system, such as a septic system, comply with local health agency requirements.
- Properly connect temporary sanitary facilities that discharge to the sanitary sewer system to avoid illicit discharges.
- Ensure that sanitary/septic facilities are maintained in good working order by a licensed service.
- Use only reputable, licensed sanitary/septic waste haulers.
- The Contractor's Water Pollution Control Manager (WPCM) shall monitor on site sanitary/septic waste storage and disposal procedures at least weekly.

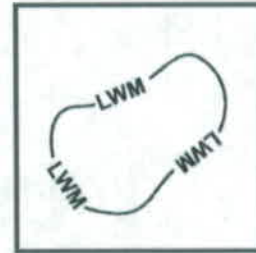
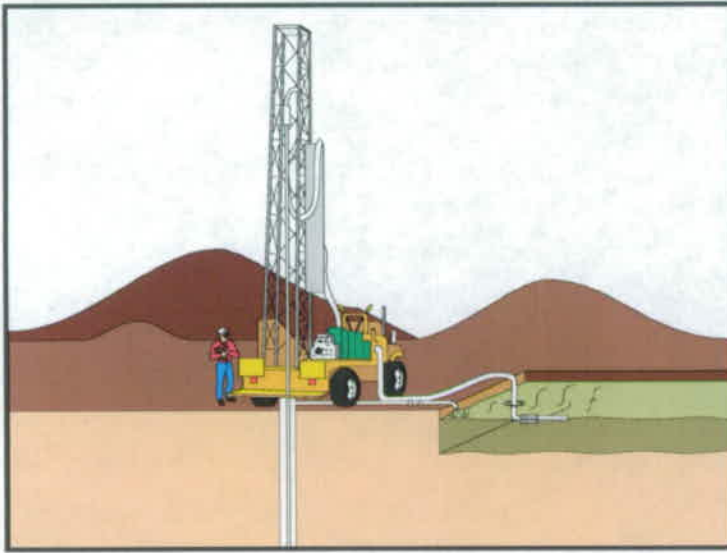
Maintenance and  
Inspection



# Liquid Material Management

**WM-8**

Adapted from Caltrans Construction Site BMPs



## BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

**Definition and Purpose** Procedures and practices to prevent discharge of pollutants to the storm drain system or to watercourses as a result of the creation, collection, and disposal of non-hazardous liquid materials.

**Appropriate Applications** This BMP is applicable to construction projects that generate any of the following non-hazardous byproducts, residuals, or wastes, such as:

- Drilling slurries and drilling fluids
- Grease-free and oil-free wastewater and rinse water
- Dredgings
- Other non-storm water liquid discharges not permitted by separate permits.

**Limitations**

- Disposal of some liquids may be subject to specific laws and regulations, or to requirements of other permits secured for the construction project (e.g., National Pollutant Discharge Elimination System [NPDES] permits, Army Corps permits, etc.).
- This fact sheet does not apply to dewatering operations (see BMP NS-2 Dewatering Operations), solid waste management (see BMP WM-5, "Construction Debris and Litter Management"), hazardous wastes (see Standard Specifications Section 107), or concrete slurry residue (see BMP WM-06, "Concrete Waste Management").
- This fact sheet does not apply to non-stormwater discharges permitted by any NPDES permit held by NDOT. Typical permitted non-stormwater discharges can include: water line flushing; landscape irrigation; diverted stream flows; rising ground waters; pumped ground water; discharges from potable water sources;

foundation drains; irrigation water; springs; water from crawl space pumps; footing drains; lawn watering; flows from riparian habitats and wetlands; and, discharges or flows from emergency fire fighting activities.

## Standards and Specifications

### **General Practices**

- Follow all applicable federal, state and local regulations.
- The Contractor's Water Pollution Control Manager (WPCM) shall oversee and enforce proper liquid waste management procedures and practices.
- Instruct employees and subcontractors how to safely differentiate between non-hazardous liquids and potential or known hazardous liquids.
- Instruct employees, subcontractors, and suppliers that it is unacceptable for any sediment laden liquid to enter any storm drainage device, waterway, or receiving water without treatment.
- Educate employees and subcontractors on the proper handling procedures for all liquids generated during construction activities.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Verify which non-stormwater discharges are permitted by the NDOT Statewide NPDES permit. Some listed discharges may require pre-treatment or treatment.
- Manage wash water and rinse water from vehicle and equipment cleaning operations (see BMP NS-8, "Vehicle and Equipment Cleaning").

### **Containing Liquid Wastes**

- Drilling residue and drilling fluids shall not be allowed to enter storm drains and watercourses and shall be disposed of outside the highway right-of-way in conformance with the provisions in Standard Specifications Section 107.
- If an appropriate location is available, drilling residue and drilling fluids may be dried in a containment facility constructed in conformance with the provisions detailed in BMP WM-06, "Concrete Waste Management".
- Liquids generated as part of an operational procedure, such as water-laden dredged material and drilling mud shall be contained and not allowed to flow into drainage channels or receiving waters prior to treatment.



- Contain all liquids generated during construction in a controlled area, such as a holding pit, sediment basin, roll-off bin, or portable tank.
- Containment devices must be structurally sound and leak free.
- Containment devices must be of sufficient quantity or volume to completely contain the liquid wastes generated.
- Take precautions to avoid spills or accidental releases of contained liquids. Apply the education measures and spill response procedures outlined in BMP WM-04, "Spill Prevention and Control".
- Do not locate containment areas or devices where accidental release of the contained liquid can threaten health or safety, or discharge to water bodies, channels, or storm drains.

## ***Capturing Liquid Materials***

- Capture all liquid materials running off of a surface, which have the potential to affect the storm drainage system.
- Do not allow liquid materials to flow or discharge uncontrolled. Use temporary dikes or berms to intercept flows and direct them to a containment area or device for capture.
- If the liquid is sediment laden, use a sediment trap (see BMP SC-03, "Sediment Trap") for capturing and treating the liquid stream, or capture in a containment device and allow sediment to settle.

## ***Disposing of Liquid Materials***

- Typical method is to dewater the contained liquid waste, using procedures such as described in BMP NS-02, "Dewatering Operations", and BMP SC-02, "Sediment/Desilting Basin"; and dispose of resulting solids per BMP WM-5, "Construction Debris and Litter Management", in conformance with Standard Specifications Section 107.
- Method of disposal for some liquids may be prescribed in Water Quality Reports, NPDES permits, Environmental Impact Reports, 404 permits, etc., and may be defined elsewhere in the Special Provisions.
- Some liquids, such as from dredged material, may require testing and/or review by the NDEP to determine whether it is hazardous before a disposal method can be determined.
- For disposal of hazardous waste, see Standard Specifications Section 107.
- If necessary, further treat non-hazardous liquid materials prior to

disposal. Treatment may include, though is not limited to, sedimentation, filtration, and chemical neutralization.

## Maintenance and Inspection

- Spot check employees and subcontractors at least monthly throughout the job to ensure appropriate practices are being employed.
- Remove deposited solids in containment areas and capturing devices as needed, and at the completion of the task. Dispose of any solids as described in BMP WM-05, "Construction Debris and Litter Management".
- Inspect containment areas and capturing devices frequently for damage, and repair as needed.



## Appendix A

# Appendix A

## Abbreviations, Acronyms, and Definition of Terms

### Abbreviations

ac	acre
°C	Degrees Celsius
cfs	cubic feet per second
cy	cubic yards
°F	Degrees Fahrenheit
ft	feet
g	gram
gal	gallon
gpm	gallons per minute
ha	hectares
hr	hour
in	inches
kg	kilogram
kN	Kilo-Newton
kPa	Kilo-Pascal
l	liter
lbs	pound
lf	linear feet
m	meter
m <sup>2</sup>	square meters
m <sup>3</sup>	cubic meters
mm	millimeter
N	Newton
psi	pounds per square inch
s	second
yd	yard
y <sup>2</sup>	square yards
y <sup>3</sup>	cubic yards

### Acronyms

AASHTO	American Society of State Highway and Transportation Officials
AC	Asphalt Concrete
ABS	Acrylonitrile Butadiene Styrene
APCD	Air Pollution Control District
AQMD	Air Quality Management District
ARB	Air Resources Board
ASCA	American Society of Certified Arborists
ASTM	American Society of Testing Materials
BMP	Best Management Practice
BOD	Biochemical Oxygen Demand
CCS	Cellular Confinement System
CMP	Corrugated Metal Pipe
CFR	Code of Federal Regulations
DSA	Disturbed Soil Area
ESA	Environmentally Sensitive Area
FEMA	Federal Emergency Management Agency
L:W	Length versus Width
MSDS	Material Safety Data Sheet
NDEP	Nevada Division of Environmental Protection
NPDES	National Pollutant Discharge Elimination System



OSHA	Occupation Safety and Health Association	V:H	Vertical versus Horizontal
PCC	Portland Cement Concrete	USACE	United States army Corps of Engineer
PPCBR	Portable Precast Concrete Barrier Rails	USDA	United States Department of Agriculture
PVC	Polyvinyl Chloride	USDOT	United States Department of Transportation
QPL	Qualified Product List	US EPA	United States Environmental Protection Agency
RE	Resident Engineer	USFWS	United Fish and Wildlife Services
ROW	Right of Way	USLE	Universal Soil Loss Equation
SSP	Standard Special Provisions	WPCM	Water Pollution Control Manager
SWPPP	Storm Water Pollution Prevention Plan	WPCP	Water Pollution Control Plan
TRPA	Tahoe Regional Planning Agency		

## Definition of Terms

**Active Construction Area:** Construction areas where soil-disturbing activities have already occurred and continue to occur or will occur during the ensuing 21 days. This may include areas where soils have been disturbed as well as areas where soil disturbance has not yet occurred.

**Antecedent Moisture:** Amount of moisture present in soil prior to the application of a soil stabilization product.

**Best Management Practice (BMP):** Any program, technology, process, siting criteria, operating method, measure, or device that controls, prevents, removes, or reduces pollution.

**Construction Activity:** Includes clearing, grading, or excavation and contractor activities that result in soil disturbance.

**Construction Site:** The area involved in a construction project as a whole.

**Contamination:** An impairment of the quality of the waters of the state by waste to a degree that creates a hazard to the public health through poisoning or through the spread of disease including any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected.

**Contractor:** Party responsible for carrying out the contract per plans and specifications. The Standard Specifications and Special Provisions contain storm water protection requirements the contractor must address.

**Degradability:** Method by which the chemical components of a soil stabilization product are degraded over time.

**Discharge:** Any release, spill, leak, pump, flow, escape, dumping, or disposal of any liquid, semi-solid or solid substance.

**Disturbed Soil Areas (DSAs):** Areas of exposed, erodible soil, including stockpiles, that are within the construction limits and that result from construction activities

**Drying Time:** Time it takes for a soil stabilization product to dry or cure for it to become erosion control effective.

**Environmental Protection Agency (EPA):** Agency that issued the regulations to control pollutants in storm water runoff discharges (The Clean Water Act and NPDES permit requirements).

**Erosion:** The wearing away of land surface primarily by wind or water. Erosion occurs naturally as a result of weather or runoff but can be intensified by clearing, grading, or excavation of the land surface.

**Erosion Control Effectiveness:** The ability of a particular product to reduce soil erosion relative to the amount of erosion measured for bare soil. Percentage of erosion that would be reduced as compared to an untreated or control condition.

**Exempt Construction Activities:** Activities exempt from the General Permit, including routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility; and emergency construction activities required to protect public health and safety. Local permits may not exempt these activities.

**Existing vegetation:** Any vegetated area that has not already been cleared and grubbed.

**Fair Weather Prediction:** When there is no precipitation in the forecast between the current calendar day and the next working day. The National Weather Service NOAA Weather Radio forecast shall be used. The contractor may propose an alternative forecast for use if approved by the Resident Engineer.

**Feasible:** Economically achievable or cost-effective measures, which reflect a reasonable degree of pollutant reduction achievable through the application of available nonpoint pollution control practices, technologies, processes, site criteria, operating methods, or other alternatives.

**General Permit:** The General Permit for Storm Water Discharges Associated with Construction Activity (Stormwater General Permit NVR100000) issued by the Nevada Division of Environmental Protection.

**Good Housekeeping:** A common practice related to the storage, use, or cleanup of materials, performed in a manner that minimizes the discharge of pollutants.



**Local permit:** An NPDES storm water permit issued to a District by the NDEP having jurisdiction over the job site. Requirements of the local permit are generally similar to, but supersede the requirements of the General Permit.

**Longevity:** The time the soil erosion product maintains its erosion control effectiveness.

**Mode of Application:** Type of labor or equipment that is required to install the product or technique.

**National Pollutant Discharge Elimination System (NPDES) Permit:** A permit issued pursuant to the Clean Water Act that requires the discharge of pollutants to waters of the United States from storm water be controlled.

**Native:** Living or growing naturally in a particular region. Compatibility and competitiveness of selected plant materials with the environment.

**Non-active Construction Area:** Any area not considered to be an active construction area. Active construction areas become non-active construction areas whenever construction activities are expected to be discontinued for a period of 21 days or longer.

**Non-Storm Water Discharge:** Any discharge to a storm drain system or receiving water that is not composed entirely of storm water.

**Pollution:** The man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of water. An alteration of the quality of the water of the state by waste to a degree, which unreasonably affects either the waters for beneficial uses or facilities that serve these beneficial uses.

**Rainy Season:** The dates of the rainy season shall be as specified: use dates in the local permit if a local permit is applicable to the project site and rainy season dates are specified therein; or, if the local permit does not specify rainy season dates and/or in areas of the state not subject to a local permit, the rainy season dates shall be determined using Figure 2-1.

**Receiving Waters:** All surface water bodies within the permit area.

**Resident Engineer (RE):** The NDOT representative charged with administration of construction contracts. The RE decides questions regarding acceptability of material furnished and work performed. The RE has "contractual authority" to direct the contractor and impose sanctions if the contractor fails to take prompt and appropriate action to correct deficiencies. The following contractual sanctions can be imposed by the RE: (a) withholding payments (or portions of payments), (b) suspending work, (c) bringing in a separate contractor to complete work items (the contractor is billed for such costs), (d) assessing liquidated damages including passing along fines for permit violations, (e) initiating cancellation of the construction contract.

**Residual Impact:** The impact that a particular practice might have on construction activities once they are resumed on the area that was temporarily stabilized.

**Runoff Effect:** The effect that a particular soil stabilization product has on the production of storm water runoff. Runoff from an area protected by a particular product may be compared to the amount of runoff measured for bare soil.

**Sediment:** Organic or inorganic material that is carried by or suspended in water and that settles out to form deposits in the storm drain system or receiving waters.

**Storm Drain System:** Streets, gutters, inlets, conduits, natural or artificial drains, channels and watercourses, or other facilities that are owned, operated, maintained and used for the purpose of collecting, storing, transporting, or disposing of storm water.

**Storm Water:** Rainfall runoff, snow melt runoff, and surface runoff and drainage. It excludes infiltration and runoff from agricultural land.

**Storm Water Inspector:** NDOT staff member who provides support to the Resident Engineer. Coordinates activities and correspondence related to WPCP and SWPPP review and implementation.

**Storm Water Pollution Prevention Plan (SWPPP):** A plan required by the General Permit that includes site map(s), an identification of construction/contractor activities that could cause pollutants in the storm water, and a description of measures or practices to control these pollutants. It must be prepared and approved before construction begins. A SWPPP prepared in accordance with the special provisions and the Handbooks will satisfy Standard Specifications Section 637.01.02 - Water Pollution Control Plan, requirement for preparation of a program to control water pollution.

**Temporary Construction Site BMPs:** Construction Site BMPs that are required only temporarily to address a short-term storm water contamination threat. For example, silt fences are located near the base of newly graded slopes that have a substantial area of exposed soil. Then, during rainfall, the silt fences filter and collect sediment from runoff flowing off the slope.

**Water Pollution Control Program (WPCP):** A program that must be prepared and implemented by the construction contractor under Standard Specifications Section 637.01.02 - Water Pollution Control Plan.



## Appendix B

## INSTRUCTIONS

- The title page shall have the following information:
  - ☐ Title: "Storm Water Pollution Prevention Plan"
  - ☐ Construction Project Name
  - ☐ NDOT Contract Number
  - ☐ Identification and address of Lead Agency (NDOT or Local Agency)
  - ☐ NDOT Engineer Name and Telephone Number
  - ☐ Contractor's Name, Address, Telephone Number and Contact Person
  - ☐ Job Site Address and Telephone Number, if Any
  - ☐ Name of Contractor's representative. This person shall be responsible for SWPPP implementation, inspection and repairs, and shall be available at all times throughout the duration of the project.
  - ☐ Name of the company that prepared the SWPPP (if it was prepared by an outside consultant), including name and title of preparer
  - ☐ SWPPP Preparation Date
- A template title page is provided below.

## REQUIRED TEXT:

# STORM WATER POLLUTION PREVENTION PLAN

for

**Start Here...Triple Click here to insert Project Name-then TAB to next field**

**INSERT NDOT CONTRACT NUMBER-THEN TAB TO NEXT FIELD.**

*Prepared by:*

**Insert Contractor's Company Name-then TAB.**

**Insert Address 1 then press ENTER to insert Address 2 or TAB to next field.**

**Insert City, State, ZIP-then TAB.**

**Insert Telephone-then TAB.**

**Insert Contractor Representative's Name-then TAB.**

*Project Site Address*

**Insert job site address if any. Press the DELETE key if not and TAB to next field.**



Insert job site telephone number, if any. Press the DELETE key if not and TAB to next field.

SWPPP Prepared by:

Insert Company Name-then TAB.

Insert Address-then TAB.

Insert City, State, ZIP-then TAB.

Insert Telephone-then TAB

Insert Name and Title of Preparer-then TAB.

SWPPP Preparation Date

Insert Date

**NOTE:** A working copy of this SWPPP must be kept at the construction site or be locally available for review by NDEP and local regulatory agencies.

A copy of Stormwater General Permit NVR100000 and the Notice of Intent for this project must be attached to the SWPPP.

Guidance for selecting and implementing BMPs is available in the NDOT Construction BMP Handbook. Attach additional pages when necessary to provide the required information.

## INSTRUCTIONS

- ☐ Include the numbers and names for each section of the SWPPP, from Section 100 to Section 600. List the first page number of each subsection.
- ☐ Include a Tab for each major section of the SWPPP and for each of the attachments.

## REQUIRED TEXT:

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### **SWPPP Attachments**

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Attachment B .....	BMP Site Plans
Attachment C .....	BMP Consideration Checklist
Attachment D .....	Computation Sheet for Determining Runoff Coefficients
Attachment E .....	Computation Sheet for Determining Run-on Discharges
Attachment F .....	Notice of Intent (NOI)
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Attachment H .....	Storm Water Quality Construction Site Inspection Checklist
Attachment I .....	Discharge Reporting Sample Form
Attachment J .....	Other Approved State or Local Plans and Permits
Attachment K .....	Nevada Stormwater General Permit

## Section 100

### SWPPP Certifications and Acceptance

#### 100.1 Initial SWPPP Certification

<b>INSTRUCTIONS:</b>
----------------------

- ☐ Include a Separator and Tab for Section 100 for ready reference.
- The contractor is required by the *Construction Site BMPs Manual* to prepare and implement the SWPPP, and shall sign and certify the SWPPP in conformance with Section I.B. of the General Permit for Storm Water Discharges Associated with Construction Activity NVR100000 ("General Permit").
- The SWPPP shall be submitted to NDOT for acceptance.
- ☐ Fill in the project name and the contract number at the top of the form.
- ☐ Certification shall be signed and dated by Contractor's staff; specifically, the person responsible for overall management of the site, such as a corporate officer or person assigned the responsibility by a corporate officer, according to corporate procedures.
- ☐ Fill in the name, title and telephone number of the person signing the certification.
- ☐ The Notice of Intent (NOI) is to be attached in Attachment F. The completed form will be provided by NDOT.

<b>REQUIRED TEXT: To be completed by Contractor</b>
---

Project Name: Start Here...Triple Click here to insert Project Name-then TAB to next field

NDOT Contract Number: INSERT NDOT CONTRACT NUMBER-THEN TAB TO NEXT FIELD.

"I certify under a penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. I also confirm that a storm water pollution prevention plan (SWPPP) has been completed, will be maintained at the project site from the start of construction activities, and that the SWPPP will be compliant with any applicable local sediment and erosion control plans. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the



best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines for knowing violations."

---

---

Contractor's Signature

---

Date

---

Contractor's Name and Title

---

Contractor's Telephone Number

## 100.2 Annual Fee

### **INSTRUCTIONS:**

- Section II.B.6 of the General Permit requires that the Permittee submits an annual fee in accordance with NAC 445A.268 on or before July 1 every year except the year the filing fee is submitted.

### **REQUIRED TEXT:**

On or before July 1 of each year, except the year the filing fee is submitted, the contractor shall submit an annual fee to the Nevada Department of Environmental Protection (NDEP) in accordance with Section II.B.6 of the General Permit.



## Section 200

### SWPPP Amendments

#### 200.1 SWPPP Amendment Certification and Approval

<b>INSTRUCTIONS:</b>
----------------------

- ☐ Include a Separator and Tab for Section 200 for ready reference.
- When changes in the approved SWPPP are required based on inspection results, the contractor shall prepare and certify an amendment and submit it to the Engineer for acceptance. Revisions to the SWPPP shall be completed within 7 days following receipt of inspection results or prior to the next anticipated storm event, whichever is sooner.
- The SWPPP shall be amended:
  - Whenever there is a change in construction or operations which may affect the discharge of pollutants to surface waters, groundwater(s), or a municipal separate storm sewer system (MS4); or
  - If any condition of the Permits is violated or the general objective of reducing or eliminating pollutants in storm water discharges has not been achieved. If NDEP determines that a Permit violation has occurred, the SWPPP shall be amended and implemented within 14-calendar days after notification by NDEP;
  - Annually, prior to the defined rainy season, when required by the *Construction Site BMPs Manual*; and
  - When deemed necessary by NDOT.
- All SWPPP amendments shall be transmitted in letter format and shall include revised WPCD sheets, as appropriate.
- All amendments shall be recorded in the SWPPP amendment log that is located in Section 200.2 of the SWPPP.
- Approved amendments will be inserted into the Contractor's on-site SWPPP. Contractor Certifications and Engineer acceptances for all amendments shall be inserted into this section.
- The following items shall be included in each amendment:
  - Discuss who requested the amendment.
  - Describe the location of proposed change.
  - Describe reason for change.
  - Describe the original BMP proposed, if any.
  - Describe the new BMP proposed.
  - Describe any existing implemented BMP(s)
- ☐ This SWPPP certification and approval form shall be used as a cover sheet for each amendment.
- ☐ Fill-in the Project name and NDOT contract number.

- ☐ The Contractor shall sign and date the certification form.
- ☐ The Engineer shall sign and date the acceptance form.
- ☐ Print the names and telephone numbers.

**EXAMPLE:**

NDEP has requested the following Amendment:

The concrete washout is to be relocated away from the drainage inlet at Miller Ave. It is now located on the northeast section of the construction site, see revised map. This change will prevent concrete washout water from entering the drainage inlet.

**REQUIRED TEXT:**

This SWPPP shall be amended:

- Whenever there is a change in construction or operations which may affect the discharge of pollutants to surface waters, groundwater(s), or a municipal separate storm sewer system (MS4); or
- If any condition of the Permits is violated or the general objective of reducing or eliminating pollutants in storm water discharges has not been achieved. If NDEP determines that a Permit violation has occurred, the SWPPP shall be amended and implemented within 14-calendar days after notification by NDEP;
- Annually, prior to the defined rainy season, when required by the *Construction Site BMPs Manual*; and
- When deemed necessary by NDOT.
- Within 7 calendar days following an inspection that shows that BMPs need to be modified or if additional BMPs are necessary

The following items will be included in each amendment:

- Who requested the amendment.
- The location of proposed change.
- The reason for change.
- The original BMP proposed, if any.
- The new BMP proposed.



The amendments for this SWPPP, along with the Contractor's Certification, can be found in the following pages. Amendments are listed in the Amendment Log in Section 200.2

INSERT ADDITIONAL RESPONSIBILITIES AND/OR NAMES HERE OR DELETE THIS LINE  
(Use the "FORMAT OPTIONS" button to insert subtitles and/or paragraphs)

**SWPPP Amendment No. \_\_\_\_\_**

Project Name: Start Here...Triple Click here to insert Project Name-then TAB to next field

NDOT Contract Number: Insert NDOT CONTRACT NUMBER-THEN TAB TO NEXT FIELD.

---

**To Be Completed by Contractor**

"I certify under a penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. I also confirm that a storm water pollution prevention plan (SWPPP) has been completed, will be maintained at the project site from the start of construction activities, and that the SWPPP will be compliant with any applicable local sediment and erosion control plans. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines for knowing violations."

\_\_\_\_\_  
Contractor's Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Contractor's Name and Title

\_\_\_\_\_  
Contractor's Telephone Number



## 200.2 Amendment Log

### INSTRUCTIONS:

- SWPPP amendment(s) prepared and approved as discussed in Section 200.1 shall be documented in the Amendment Log, which shall be kept in Section 200 of the SWPPP, immediately following the Certification and Approval forms.
- All amendments shall be dated, directly attached to the SWPPP, and listed in the Amendment Log.
- ☐ Enter the project name, and NDOT contract number at the top of the form.
- ☐ Enter the Amendment number, Date, Brief Description, and Name of Person Who Prepared the Amendment in the table.

### EXAMPLE:

Amendment No.	Date	Brief Description of Amendment	Prepared By
001	Dec 10, 2000	Grading schedule changed to begin on Feb 10, 2001, and will include additional 2 acres. Amended plans attached to SWPPP.	John Doe, Superintendent

### REQUIRED TEXT:

Project Name: Start Here...Triple Click here to insert Project Name-then TAB to next field

NDOT Contract Number: Insert NDOT CONTRACT NUMBER-THEN TAB TO NEXT FIELD.

Amendment No.	Date	Brief Description of Amendment	Prepared By

**Storm Water Pollution Prevention Plan (SWPPP)**  
**Start Here...Triple Click here to insert Project Name-then TAB to next field**  
**Contract No. INSERT NDOT CONTRACT NUMBER-THEN TAB TO NEXT FIELD.**

---

Amendment No.	Date	Brief Description of Amendment	Prepared By

---

**INSERT CONTRACTOR'S COMPANY NAME-THEN TAB.**

SWPPP Template 2000VBA NDOT.doc

Insert Date

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## Section 300

### Introduction and Project Description

#### 300.1 Project Description

##### **INSTRUCTIONS:**

- ☐ Include a Separator and Tab for Section 300 for ready reference.
- Provide the project description.
  - ☐ Permittee: Company or Agency Name, Address, and Telephone Number
  - ☐ Contact information: Name, Address, and Telephone Number
  - ☐ Person responsible for implementation of SWPPP: Name, Address, and Telephone Number(s) of the Contractor's representative. The Contractor's representative shall have primary responsibility and significant authority for the implementation, maintenance, inspection and amendments to the approved SWPPP.
  - ☐ Project Name and Project Location: Name, Address, City, County
  - ☐ Project Description
    - ☐ Describe the nature of the construction activity
    - ☐ Describe the intended sequence of major activities which disturb soils for major portions of the site (e.g. grubbing, excavation, grading, utilities, and infrastructure installation)

##### **REQUIRED TEXT:**

CLICK AND TYPE PROJECT NAME HERE

CLICK AND TYPE PROJECT LOCATION (ADDRESS, CITY, COUNTY) HERE

CLICK AND TYPE PROJECT DESCRIPTION HERE

The Permittee is:

**Insert Contractor's Company Name-then TAB.**

**Insert Address 1 then press ENTER to insert Address 2 or TAB to next field.**

**Insert City, State, ZIP-then TAB.**

The Contractor's contact information for this project is:

**Insert Contractor Representative's Name-then TAB.**

---

INSERT CONTRACTOR'S COMPANY NAME-THEN TAB.

SWPPP Template 2000VBA NDOT.doc

Insert Date

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Insert Contact Phone Number

The Contractor's representative shall have responsibility for the implementation, maintenance, inspection and amendments to the approved SWPPP. The Contractor's representative will be available at all times throughout duration of the project. Duties of the Contractor's representative include but are not limited to:

- Ensuring full compliance with the SWPPP and the Permit
- Implementing all elements of the SWPPP, including but not limited to:
  - Implementation of prompt and effective erosion and sediment control measures
  - Implementing all non-storm water management, and materials and waste management activities such as: monitoring discharges (dewatering, diversion devices); general site clean-up; vehicle and equipment cleaning, fueling and maintenance; spill control; ensuring that no materials other than storm water are discharged which will have an adverse effect on receiving waters or storm drain systems; etc.
- Pre-storm inspections
- Post-storm inspections
- Storm event inspections
- Routine inspections as specified in the *Construction Site BMPs Manual* or described in the SWPPP.
- Ensuring elimination of all unauthorized discharges
- The Contractor's representative shall be assigned authority by the Contractor to mobilize crews in order to make immediate repairs to the control measures
- Submitting Notices of Discharge and reports of Illicit Connections or Illegal Discharges

INSERT ADDITIONAL RESPONSIBILITIES AND/OR NAMES HERE OR DELETE THIS LINE  
(Use the "FORMAT OPTIONS" button to insert subtitles and/or paragraphs)

## **300.2 Pollution Prevention Implementation Schedule**

### **INSTRUCTIONS:**

- ☐ Provide a written and a graphical project schedule. The schedule shall clearly show how the rainy season relates to soil-disturbing and re-stabilization activities. The schedule shall contain an adequate level of detail to show major activities sequenced which disturb soils for major portions of the site with implementation of construction site BMPs, including:

---

INSERT CONTRACTOR'S COMPANY NAME-THEN TAB.

SWPPP Template 2000VBA NDOT.doc

Insert Date

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- ☐ project start and finish dates
- ☐ rainy season dates
- ☐ mobilization dates
- ☐ mass clearing and grubbing/roadside clearing dates
- ☐ dates when major grading/excavation activities occur
- ☐ Dates when construction activities temporarily or permanently cease on a portion of the site
- ☐ utilities and infrastructure installation dates
- ☐ special dates named in other permits such as Fish and Game and Army Corps of Engineers Permits
- ☐ dates for implementation of pre-rainy season temporary soil stabilization and temporary sediment control BMPs, if required by the Construction Site BMPs Manual
- ☐ rainy season implementation schedule
  - ☐ deployment of temporary soil stabilization BMPs
  - ☐ deployment of temporary sediment control BMPs
  - ☐ deployment of wind erosion control BMPs
  - ☐ deployment of tracking control BMPs
  - ☐ deployment of non-storm water BMPs
  - ☐ deployment of waste management and materials pollution control BMPs
- ☐ non-rainy season implementation schedule
  - ☐ deployment of temporary soil stabilization BMPs
  - ☐ deployment of temporary sediment control BMPs
  - ☐ deployment of wind erosion control BMPs
  - ☐ deployment of tracking control BMPs
  - ☐ deployment of non-storm water BMPs
  - ☐ deployment of waste management and materials pollution control BMPs
- ☐ paving, saw-cutting, and any other pavement related operations
- ☐ major planned stockpiling operations
- ☐ dates for other significant long-term operations or activities that may plan non-storm water discharges such as dewatering, grinding, etc.
- ☐ final stabilization activities staged over time for each area of the project

### **EXAMPLE #1: Written Schedule**

Estimate Construction Start: 05/01/2000  
Estimate Construction Finish: 04/15/2002  
Mobilization of equipment and materials to begin on 05/01/2000  
Install ESA fencing 05/01/2000  
Store temporary soil stabilization and temporary sediment control products beginning on 05/01/2000  
Install stabilized construction entrance on 05/01/2000  
Site preparation: Clearing and grubbing (Phase I) will occur from 05/25/2000-06/30/2000  
Submit annual rainy season implementation schedule 09/25/2000  
Prepare soil stabilization and sediment control implementation plan 20 days prior to the rainy season; submit to NDOT by 09/25/2001  
Start implementation of temporary soil stabilization and sediment control BMPs on 09/28/00 (before rainy season starts). Continue to implement and maintain temporary BMPs throughout rainy season.  
Complete installation of temporary soil stabilization and sediment control BMPs on 10/05/2000  
Rainy season begins 10/15 2000  
Earthwork/roadway widening excavation to begin on 06/30/2000 and continue through 02/20/2001  
Roadway widening – grading work 07/15/2000 – 02/20/2001  
Schedule soil stabilization subcontractors for application of temporary soil stabilization on disturbed areas and permanent erosion control on areas substantially complete: 09/01/2000  
Rainy season ends 04/15/2001  
Clearing and grubbing (Phase II) from 05/01/01 through 07/30/2001  
SWPPP Annual Certification Due on 06/15/2001  
Begin trenching, backfilling and compaction on 7/15/2001  
Implement final erosion control (Type D) of substantially completed areas 08/01/2001  
Install temporary concrete washout 09/10/2001  
Fish and Game Permit starts 09/15/2001  
Begin expansion/structure construction/decks/concrete on 09/15/2001  
Submit annual rainy season implementation schedule 09/25/2001  
Start implementation of temporary soil stabilization and sediment control BMPs on 09/28/2001 (before rainy season starts). Continue to implement and maintain temporary BMPs throughout rainy season.  
Complete installation of temporary soil stabilization and sediment control BMPs on 10/05/2001  
Rainy season starts 10/15/2001  
End bridge construction on or before 01/25/2002  
End of Fish and Game Permit 01/30/2002



Begin final paving/construction on 02/01/2002. Continue to apply soil stabilization and sediment controls as needed during construction

Remove concrete washout and restore area to original grade

Schedule subcontractors for application of permanent erosion control 03/01/2002

Start final stabilization, revegetation and landscape by 03/15/2002

Project complete 04/15/2002

**REQUIRED TEXT:**

CLICK AND TYPE EITHER NARRATIVE PROJECT SCHEDULE OR STATE THAT THE GRAPHIC SCHEDULE IS ON THE FOLLOWING PAGE. ADD PAGE BREAKS AS NEEDED TO MAKE SURE THAT THE PAGE NUMBERING IS CONSISTENT THROUGHOUT THE DOCUMENT.

### 300.3 Construction Site Estimates

**INSTRUCTIONS:**

- Provide an estimate of the following site features (Refer also to Attachments D and E):
  - ☐ Total construction site area (hectares and square meters)
  - ☐ Total construction site area expected to be disturbed by excavation, grading, or other activities including offsite borrow and fill areas
    - ☐ Percentage impervious area before and after construction
    - ☐ Anticipated storm water run-on to the construction site (Show calculations and include as Attachment E).
  - ☐ Runoff coefficient of the site for pre- and post-construction conditions
  - ☐ Data describing the soil or quality of discharge from the site

**EXAMPLE:**

The following are estimates of the construction site:

Construction site area:	42.5 Ac
Percentage impervious area before construction:	51.3 % (21.8 Ac)
Runoff coefficient before construction <sup>(1)</sup> :	0.68
Percentage impervious area after construction	58.1 % (24.7 Ac)
Runoff coefficient after construction <sup>(1)</sup>	0.73
Anticipated storm water flow on to the construction site <sup>(2)</sup>	33.9 cfs

<sup>(1)</sup> Calculations are shown in Attachment D

(2) Calculations are shown in Attachment E

**EXAMPLE:**

Calculating Runoff Coefficient Before Construction:

*Existing Site Conditions*

Total Site Area:	=	42.5 Ac	(A)
Impervious Area Before Construction <sup>(1)</sup> :	=	21.7 Ac	(B)
Impervious Area Runoff Coefficient <sup>(2), (4)</sup> :	=	0.95	(C)
21.7 Ac (87,820 m <sup>2</sup> ) x 0.95	=	20.6 Ac	(B x C)
Pervious Area Before Construction <sup>(3)</sup> :	=	20.8 Ac	(D)
Pervious Area Runoff Coefficient <sup>(4)</sup> :	=	0.40	(E)
20.8 Ac (84,180 m <sup>2</sup> ) x 0.40	=	8.32 Ac	(D x E)
20.6 Ac (83,429 m <sup>2</sup> ) + 8.32 Ac (33,672 m <sup>2</sup> )	=	28.9 Ac	(B x C)+(D x E)
28.9 Ac (117,101 m <sup>2</sup> ) / 42.5 Ac (172,000 m <sup>2</sup> )	=	0.68	[(B x C)+(D x E)]/(A)
Runoff Coefficient Before Construction	=	0.68	(F)

Calculating Runoff Coefficient After Construction

*Proposed Site Conditions*

Impervious Area After Construction <sup>(1)</sup> :	=	24.7 Ac	(G)
Impervious Area Runoff Coefficient <sup>(2), (4)</sup> :	=	0.95	(H)
24.7 Ac (100,036 m <sup>2</sup> ) x 0.95	=	23.5 Ac	(G x H)
Pervious Area After Construction <sup>(3)</sup> :	=	17.8 Ac	(I)
Pervious Area Runoff Coefficient <sup>(4)</sup> :	=	0.40	(J)
17.8 Ac (71,964 m <sup>2</sup> ) x 0.40	=	7.1 Ac	(I x J)
23.5 Ac (95,034 m <sup>2</sup> ) + 7.1 Ac (28,786 m <sup>2</sup> )	=	30.6 Ac	(G x H)+(I x J)
30.6 Ac (123,820 m <sup>2</sup> ) / 42.5 Ac (172,000 m <sup>2</sup> )	=	0.72	[(G x H)+(I x J)]/(A)
Runoff Coefficient After Construction	=	0.72	(K)

<sup>(1)</sup> Includes paved areas, areas covered by buildings, and other impervious surfaces.

<sup>(2)</sup> Use 0.95 unless lower or higher runoff coefficient can be verified.

<sup>(3)</sup> Includes areas of vegetation, most unpaved or uncovered soil surfaces, and other pervious areas.

<sup>(4)</sup> See NDOT Hydraulics Manual for typical C values

**REQUIRED TEXT:**

The following are estimates of the construction site:

INSERT CONTRACTOR'S COMPANY NAME-THEN TAB.

SWPPP Template 2000VBA, NDOT.doc

Insert Date

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Construction site area	_____	Ac
Percentage impervious area before construction	_____	%
Runoff coefficient before construction <sup>(1)</sup>	_____	
Percentage impervious area after construction	_____	%
Runoff coefficient after construction <sup>(1)</sup>	_____	
Anticipated storm water flow on to the construction site <sup>(2)</sup>	_____	cfs

<sup>(1)</sup> Calculations are shown in Attachment D

<sup>(2)</sup> Calculations are shown in Attachment E

CLICK AND DESCRIBE SOIL OR QUALITY OF DISCHARGE FROM THE SITE

### 300.4 Vicinity Map

#### INSTRUCTIONS:

- The General Permit requires that a general location map and a site map be included in the SWPPP:
  - ☐ To meet the site map requirement, insert a reduced copy (8-1/2" x 11" or 11" x 17") of the project's Title Sheet in Attachment A and make reference to it in Section 300.4.
  - ☐ Provide a brief narrative description of the vicinity to support the map in Attachment A. Describe important features, drainage areas, or receiving waters that could not be shown on the map. The site map should indicate the following:
    - ☐ Drainage patterns and approximate slopes anticipated after major grading activities
    - ☐ Areas of soil disturbance
    - ☐ Areas which will not be disturbed
    - ☐ Locations of major structural and non-structural controls identified in this SWPPP
    - ☐ Locations where stabilization practices are expected to occur
    - ☐ Locations of off-site material, waste
    - ☐ Borrow or equipment storage areas
    - ☐ Surface waters (including wetlands)
    - ☐ Locations where storm water discharges to a surface water
  - ☐ Provide location and description of discharge associated with industrial activity other than construction, including storm water discharges from dedicated asphalt plants and concrete plants, covered by the General Permit

**REQUIRED TEXT:**

The construction project general location and site maps showing the project location, surface water boundaries, geographic features, construction site perimeter, and general topography, is located in Attachment A. The project's Title Sheet provides more detail regarding the project location and is also included in Attachment A.

CLICK AND TYPE LOCATION AND DESCRIPTION OF ANY DISCHARGE ASSOCIATED WITH INDUSTRIAL ACTIVITY OTHER THAN CONSTRUCTION - IF THIS DOES NOT APPLY, DELETE THIS LINE.

### 300.5 Receiving Waters and Unique Site Features

**INSTRUCTIONS:**

- ☐ Provide a brief description of any unique site features – names of receiving water(s) and the aerial extent and description of wetland or other special aquatic sites at or near the site which will be disturbed or which will receive discharges from disturbed areas of the project.

**EXAMPLE:**

The Truckee River is located within the project limits. A portion of the construction will occur within the river in order to properly construct the bridge towers. The project will also demolish an existing culvert and will replace it with a larger reinforced concrete box within the tributary.

**REQUIRED TEXT:**

CLICK AND TYPE PROJECT FEATURES HERE

### 300.6 Permit Requirements

**REQUIRED TEXT:**

A copy of the General Permit requirement is included in Attachment K.

### 300.7 BMP Site Plans

**INSTRUCTIONS:**

- Prepare BMP Site Plans in conformance with these instructions and the requirements of the General Permit requirements for a site map. Include the BMP Site Plans as Attachment B to the SWPPP.
- ☐ Include a cover sheet(s) listing the BMPs that will be used and any selected options shown on the fact sheets, along with construction notes and a legend. Use standard symbols as depicted on the



BMP fact sheets in the *Construction Site BMPs Manual*, or as shown in the Conceptual SWPPP (CSWPPP).

- ☐ The BMP Site Plans shall show locations for the BMPs that will be used.
  - ☐ BMP Fact Sheets provided in the *Construction Site BMPs Manual* may be used as appropriate and listed or included in Attachment C.
  - ☐ Additional details may be necessary to describe site-specific BMP applications. BMP details other than the ones contained in the fact sheets of the *Construction Site BMPs Manual* shall be submitted to NDOT for approval.
  - ☐ Use project layout, grading, stage construction, and/or drainage sheets as base sheets for the BMP Site Plans. Select BMPs that are appropriate for the site and show their locations on the site map.
- The base sheets shall show the construction project in detail, including:
- ☐ The construction site perimeter.
  - ☐ Geographic features within or immediately adjacent to the site. Include surface waters such as lakes, streams, springs, wetlands, estuaries, ponds, and the ocean.
  - ☐ Site topography before and after construction. Include roads, paved areas, buildings, slopes, drainage facilities, and areas of known or suspected contamination.
  - ☐ Permanent (post-construction) BMPs. These are usually shown on the project plans.
- Also delineate the following site information:
- ☐ Discharge points from the project to off-site storm drain systems or receiving waters
  - ☐ Tributary areas and drainage patterns across the project area (show using flow arrows) into each on-site storm water inlet or receiving water.
  - ☐ Tributary areas and drainage patterns to each on-site storm water inlet, receiving water or discharge point.
  - ☐ Off-site tributary drainage areas that generate run-on to the project. (Where off-site tributary drainage areas are too large to depict on the drawings, use map notes or inserts illustrating the upstream drainage areas).
  - ☐ Temporary on-site drainage(s) to carry concentrated flows.
  - ☐ Drainage patterns and slopes anticipated after major grading activities are completed
  - ☐ Outline all areas of existing vegetation, soil cover, or native vegetation that will remain undisturbed during the project.
  - ☐ Outline all areas of soil disturbance (disturbed soil areas, DSAs). Indicate which areas will be disturbed during the rainy season and which areas will be left exposed during the rainy season.
  - ☐ Identify location(s) of contaminated or hazardous soils.
  - ☐ Locate potential non-storm water discharges and activities, such as dewatering operations, concrete saw-cutting or coring, pressure washing, waterline flushing, diversions, cofferdams, and vehicle and equipment cleaning. If operations can't be located, provide a narrative description.

- Show proposed locations for all construction site BMPs. Include additional detail drawings if necessary to convey site-specific configurations.
  - ☐ Show temporary soil stabilization and temporary sediment control BMPs that will be used during construction. Including temporary on-site drainage(s) to carry concentrated flows, BMPs implemented to divert off-site drainage around or through the construction site, and BMPs that protect storm water inlets.
  - ☐ Locate site ingress and egress points and any proposed temporary construction roads.
  - ☐ Show BMPs to mitigate or eliminate non-storm water discharges.
  - ☐ Show BMPs for waste management and materials pollution control, including, but not limited to storage of soil or waste; construction material loading, unloading, storage and access areas; and areas designated for waste handling and disposal.
  - ☐ Show BMPs for vehicle and equipment storage, fueling, maintenance, and cleaning.
  - ☐ Show location of all post-construction BMPs.
- ☐ If the Contractor's yard, staging areas, storage yards, material borrow areas, and access roads for the project area not within the project right-of-way, but is located in the vicinity of the project, the BMP Site Plans shall show all BMPs to be used at those areas.
- The BMP Site Plans shall reflect the Contractor's phasing and/or construction staging, and shall address the entire scope of the contract work. (The contractor may address certain individual operations at a later date per the SWPPP amendment process established in Sections 200.1 and 200.2)

**EXAMPLE:**

The BMP Site Plans can be found in Attachment B of the SWPPP.

**REQUIRED TEXT:**

The BMP Site Plans can be found in Attachment B of the SWPPP.



## Section 400

### References

#### INSTRUCTIONS:

- ☐ Include a Separator and Tab for Section 400 for ready reference.
- ☐ Identify and prepare a list of the documents referenced in the SWPPP. Project Plans & Specifications, reports, design, and storm water management related documents used to prepare the SWPPP shall also be included in the references.
- Documents that shall be referenced are:
  - ☐ All permits that apply to the project (Federal, state and local), such as Fish and Game, U.S. Army Corps of Engineers, local Permits (such as Air Quality –related permits) or specific requirements, etc.
- Referenced materials may also include:
  - ☐ On-site project information such as the project plans and specifications, Geotechnical Report, Drainage Report, NDOT-prepared Conceptual SWPPP, other reports provided by the owner, regulatory guidance from federal or state agencies, and published technical specifications
- The reference for each document shall include:
  - ☐ Complete name of the referenced document
  - ☐ Number of the document (if applicable)
  - ☐ Author
  - ☐ Date Published
  - ☐ Document date/revision that applies
- Referenced documents shall be kept on-site and be readily available for review.

#### EXAMPLE:

The following documents are made a part of this SWPPP by reference:

- Project plans and specifications No. xx-xxxx
- Nevada Division of Environmental Protection, General Permit for Storm Water Discharges Associated with Construction Activity No. NVR100000 (“General Permit”).
- Separate permit under Section 404 of the Clean Water Act for solid materials

- US Army Corps of Engineers, Nationwide Permit 26-authorization letter, dated xx/xx/xx.
- Storm Water Management for Construction Activities – Developing Pollution Prevention Plans and Best Management Practices, USEPA 832-R-92-005, October 1992.

**REQUIRED TEXT:**

The following documents are made a part of this SWPPP by reference:

- Project plans and specifications No. INSERT NUMBER, dated INSERT DATE, prepared by NDOT OR OTHER ENTITY PREPARING THE PS&E.
- Nevada Division of Environmental Protection, General Permit for Storm Water Discharges Associated with Construction Activity No. NVR100000 (“General Permit”).
- CLICK AND TYPE OTHER REFERENCES HERE
-



## Section 500

### Body of SWPPP

#### 500.1 Objectives

##### INSTRUCTIONS:

- ☐ Include a Separator and Tab for Section 500 for ready reference.
- The SWPPP objectives are described in the General Permit and are shown below in the "required text" section. Controls, such as pollutant source identification and BMPs, and stormwater management measures will be developed in the body of the SWPPP to support the four SWPPP objectives.

##### REQUIRED TEXT:

This Storm Water Pollution Prevention Plan (SWPPP) was developed:

- To identify of all stormwater pollutant sources, including sources of sediment that may affect the quality of storm water discharges associated with construction activity (storm water discharges) from the construction site, and
- To identify, construct, implement and maintain Best Management Practices (BMPs) to reduce or eliminate stormwater pollutants in discharges and authorized non-storm water discharges from the construction site during construction, and
- Reduction of stormwater pollutant source impacts, and
- Compliance with the conditions of the General Permit.

The SWPPP has been prepared in accordance with good engineering practice and consists of project information, BMPs, inspection and maintenance, non-stormwater discharges, and a description of permanent stormwater controls that will be built as part of the project. This SWPPP conforms with the required elements of the General Permit issued by the Nevada Division of Environmental Protection (NDEP).

This SWPPP will be revised every 7 calendar days and amended to maintain accuracy if there are any changes in design or construction of the project that may affect the discharge of pollutants from the construction site to surface waters, groundwaters, or the municipal separate storm sewer system (MS4); or if the SWPPP is found to be insufficient; or to reflect any amendments to the General Permit. The SWPPP will also be amended if it is in violation of any condition of the General Permit or has not achieved the general objective of reducing pollutants in storm water discharges or when

the NDEP requires modifications to the SWPPP within a specified time frame. Prior to submitting the Notice of Intent and filing fee, the SWPPP shall be completed and available for inspection at the project site for each construction project and material plant or operation covered by the General Permit. The SWPPP shall be kept on-site and will be available for the duration of the project.

## **500.2 Erosion and Sediment Controls**

### **INSTRUCTIONS:**

- ☐ Describe appropriate control measures (i.e. BMPs) and sequence of implementation during the construction process to control pollutants in stormwater discharges to the maximum extent practicable. Indicate each Contractor that will be responsible for each control measure installation and maintenance.
- Control measures must be properly selected, installed, and maintained in accordance with the manufacturer's specifications and good engineering practices. Controls must be inspected periodically and must be replaced or modified for site situations if the control has been used inappropriately or incorrectly.
- Construction process erosion and sediment controls should be designed to retain sediment on-site to the maximum extent practicable.
- Offsite accumulations of sediment that has escaped the construction site must be removed at a frequency sufficient to minimize offsite impacts.
- Sediment must be removed from sediment traps or sedimentation ponds when design capacity has been reduced by 50%.
- Litter, construction debris, and construction chemicals exposed to stormwater shall be prevented from becoming a pollutant source for stormwater discharges.
- Offsite material storage areas used solely by the permitted project are considered part of this project and shall be addressed in this SWPPP.
- BMPs that may be implemented to control erosion on the construction site may include:
  - ☐ SS-1, Scheduling
  - ☐ SS-2, Preservation of Existing Vegetation
  - ☐ SS-6, Straw Mulch (with tackifier)
  - ☐ SS-7, Geotextiles, Plastic Covers & Erosion Control Blankets/Mats
  - ☐ SS-9, Earth Dikes/Drainage Swales & Lined Ditches
- BMPs that may be implemented to control sediment on the construction site may include:
  - ☐ SC-1, Silt fence
  - ☐ SC-4, Check dams
  - ☐ SC-5, Fiber rolls
  - ☐ SC-7, Street Sweeping and Vacuuming
  - ☐ SC-8, Sandbag barrier



☐ SC-10, Storm Drain Inlet Protection

**REQUIRED TEXT:**

The following is a list of control measures (BMPs) that will be used for each of the major construction activities described in Section 300. The Contractor responsible for installing and maintaining each control measure is also indicated below.

Control Measure:	Contractor Responsible:
■	■
■	■
■	■
■	■
■	■
■	■

INSERT ADDITIONAL NARRATIVE TEXT HERE OR DELETE THIS LINE (Use the "FORMAT OPTIONS" button to insert subtitles and/or paragraphs)

Attachment C lists all Best Management Practices (BMPs) that are minimum requirements and additional BMPs that have been selected for this project from the *Construction Site BMPs Manual*.

### 500.2.1 Soil Stabilization Practices

**INSTRUCTIONS:**

- Describe the temporary and permanent stabilization practices for the site and include an implementation schedule. Site plans should ensure that existing vegetation is preserved where attainable and that disturbed portions of the site are stabilized. Stabilization practices may include, but are not limited to:
  - ☐ Establishment of temporary vegetation
  - ☐ Establishment of permanent vegetation
  - ☐ Mulching
  - ☐ Geotextiles
  - ☐ Sod stabilization
  - ☐ Vegetative buffer strips

- ☐ Protection of trees
- ☐ Preservation of mature vegetation
- Initiate stabilization measures as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but not more than 14 days after last construction activity in those areas.
- ☐ Where initiation of stabilization measures by the 14<sup>th</sup> day after construction activity temporarily or permanently ceases is precluded by snow cover or frozen ground conditions, stabilization measures shall be initiated as soon as practicable.
- ☐ Where construction activity on a portion of the site is temporarily ceased, and earth-disturbing activities will be resumed within 21 days, temporary stabilization measures do not have to be initiated on that portion of the site.
- ☐ In arid areas (annual average rainfall of 0 to 10 inches), semiarid areas (average annual rainfall of 10 to 20 inches), and areas experiencing droughts where the initiation of stabilization measures by the 14<sup>th</sup> day after construction activity has temporarily or permanently ceased is precluded by seasonal arid conditions, stabilization measures shall be initiated as soon as practicable.
- ☐ Provide introductory paragraphs that define soil stabilization (erosion control), and give a general approach on how temporary soil stabilization BMPs will be implemented on the project.
- ☐ List all the temporary soil stabilization BMPs to be used in the project.
- ☐ Show selected temporary soil stabilization BMPs on the BMP Site Plans. Provide a narrative description of temporary soil stabilization BMPs that cannot be adequately identified on the BMP Site Plans.
- ☐ Discuss the on-site availability of temporary soil stabilization materials (materials kept for temporary soil stabilization BMPs) and proposed mobilization and implementation of temporary soil stabilization BMPs in the event of a predicted storm. Sufficient material(s) needed to install temporary soil stabilization BMPs necessary to completely protect the exposed portions (disturbed soil area) of the site from erosion and to prevent sediment discharges shall be stored on site. Areas that have already been protected from erosion using temporary or permanent physical stabilization or established vegetation stabilization BMPs are not considered to be "exposed DSAs" for purposes of this requirement.

### **EXAMPLE:**

Soil Stabilization, also referred to as erosion control, is a source control measure that is designed to prevent soil particles from detaching and becoming transported in the storm water runoff. Soil stabilization BMPs protect the soil surface by covering and/or binding the soil particles. This project will incorporate minimum temporary soil stabilization requirements, and other soil stabilization measures selected by the contractor. This construction project will implement the following practices to assure effective temporary and final soil stabilization (erosion control) during construction:

- 1) Preserve existing vegetation where required and when feasible.
- 2) Apply temporary soil stabilization (erosion control) to remaining active and non-active areas as required by the *Construction Site BMPs Manual*. Reapply as necessary to maintain effectiveness.



- 3) Implement temporary soil stabilization measures at regular intervals throughout the defined rainy season to achieve and maintain the contract's disturbed soil area requirements. When the *Construction Site BMPs Manual* requires it, temporary soil stabilization BMPs will be implemented 20 days prior to the defined rainy season.
- 4) Stabilize non-active areas within 14 days of cessation of construction activities.
- 5) Control erosion in concentrated flow paths by applying erosion control blankets, check dams, erosion control seeding, and lining swales with plastic as required in the *Construction Site BMPs Manual*.
- 6) Apply seed to areas deemed substantially complete during the defined rainy season.
- 7) At completion of construction, apply permanent erosion control to all remaining disturbed soil areas as required in the *Construction Site BMPs Manual*.

Sufficient soil stabilization materials will be maintained on-site to allow implementation in conformance with NDOT requirements and described in this SWPPP. This includes implementation requirements for active areas and non-active areas that require deployment before the onset of rain.

Implementation and locations of temporary soil stabilization BMPs are shown on the BMP Site Plans in Attachment B and/or described in this section. The BMP Consideration Checklist in Attachment C indicates the BMPs that will be implemented to control erosion on the construction site; these are:

- SS-2, Preservation of Existing Vegetation
- SS-6, Straw Mulch (with tackifier)
- SS-7, Geotextiles, Plastic Covers & Erosion Control Blankets/Mats
- SS-9, Earth Dikes/Drainage Swales & Lined Ditches

#### **Implementation of Soil Stabilization BMPs**

BMPs will be deployed in a sequence to follow the progress of grading and construction. As the locations of soil disturbance change, erosion and sedimentation controls will be adjusted accordingly to control storm water runoff at the downgrade perimeter and drain inlets. BMPs will be mobilized as follows:

##### ***Year-round:***

- The Contractor's representative will monitor weather using National Weather Service reports to track conditions and alert crews to the onset of rainfall events.
- Disturbed soil areas will be stabilized, as required by Tables 2-2 and 2-3 of the *Construction Site BMPs Manual*, with temporary soil stabilization or with permanent erosion control as soon as possible after grading or construction is complete.

##### ***During the rainy/snow season:***

- Disturbed areas will be stabilized with temporary or permanent soil stabilization (erosion control) before rain events.
- Disturbed areas that are substantially complete will be stabilized with permanent soil stabilization (erosion control) and vegetation (if within seeding window for seed establishment).



- Prior to forecasted storm events, temporary soil stabilization BMPs will be deployed and inspected.

***During the non-rainy/snow season:***

- The project schedule will sequence construction activities with the installation of both soil stabilization and sediment control measures. The construction schedule will be arranged as much as practicable to leave existing vegetation undisturbed until immediately prior to grading.

**Straw Mulch**

- Straw mulch will be primarily used throughout the disturbed areas adjacent to excavations and on shallow slopes surrounding the site. See the BMP Site Plans in Attachment B of this SWPPP for locations where straw mulch will be used.

**Geotextiles, Plastic Covers and Erosion Control Blankets/Mats**

- Geotextile blankets will be used to provide temporary and long-term stabilization for the flow line of the vegetated swale on the western boundary of the project.
- Polyethylene covers will be used to cover exposed soil and sand stockpiled material areas. Covers will be placed over stockpiles prior to forecast storm events, and anchored to prevent damage by wind.

**REQUIRED TEXT:**

Soil stabilization, also referred to as erosion control, consists of source control measures that are designed to prevent soil particles from detaching and becoming transported in storm water runoff. Soil stabilization BMPs protect the soil surface by covering and/or binding soil particles. This project will incorporate minimum temporary soil stabilization requirements, and other temporary soil stabilization measures required by the contract documents or selected by the contractor. This project will implement the following practices for effective temporary and final soil stabilization during construction:

- 1) Preserve existing vegetation where required and when feasible.
- 2) Apply temporary soil stabilization (erosion control) to remaining active and non-active areas as required by the *Construction Site BMPs Manual*. Reapply as necessary to maintain effectiveness.
- 3) Implement temporary soil stabilization measures at regular intervals throughout the defined rainy season to achieve and maintain the contract's disturbed soil area requirements. When the *Construction Site BMPs Manual* requires it, temporary soil stabilization will be implemented 20 days prior to the defined rainy season.
- 4) Stabilize non-active areas within 14 days of cessation of construction activities.
- 5) Control erosion in concentrated flow paths by applying erosion control blankets, check dams, erosion control seeding, and lining swales as required in the *Construction Site BMPs Manual*.



- 6) Apply seed to areas deemed substantially complete during the defined rainy season.
- 7) At completion of construction, apply permanent erosion control to all remaining disturbed soil areas as required in the *Construction Site BMPs Manual*.

Sufficient soil stabilization materials will be maintained on-site to allow implementation in conformance with NDOT requirements and described in this SWPPP. This includes implementation requirements for active and non-active areas that require deployment before the onset of rain.

Implementation and locations of temporary soil stabilization BMPs are shown on the BMP Site Plans in Attachment B and/or described in this section. The BMP Consideration Checklist in Attachment C indicates the BMPs that will be implemented to control erosion on the construction site. Temporary stabilization BMPs selected for the project site are listed below. The pollution prevention implementation schedule in Section 300.2 provides details on implementation of the BMPs.

- SS-1, Scheduling
- SS-2, Preservation of Existing Vegetation
- LIST
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INSERT ADDITIONAL NARRATIVE TEXT OF SOIL STABILIZATION HERE OR DELETE THIS LINE (Use the "FORMAT OPTIONS" button to insert subtitles and/or paragraphs)

The following are permanent stabilization practices for the project site. The pollution prevention implementation schedule in Section 300.2 provides details on implementation of the BMPs.

- LIST
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INSERT ADDITIONAL NARRATIVE TEXT HERE OR DELETE THIS LINE (Use the "FORMAT OPTIONS" button to insert subtitles and/or paragraphs)

## 500.2.2 Sediment Control (Structural Practices)

### INSTRUCTIONS:

- ☐ Provide introductory paragraphs that defines what is sediment controls and give a general approach on how sediment control BMPs will be implemented at the draining perimeter of disturbed soil areas, at the toe of slopes, at inlets and outfall areas at all times.
- ☐ List all the temporary sediment control BMPs to be used in the project.
- ☐ Show selected temporary sediment control BMPs on the BMP Site Plans. Provide a narrative description of temporary sediment control BMPs that cannot be adequately identified on the BMP Site Plans.
- ☐ Show BMPs used to divert off-site drainage around and/or through the construction project.
- ☐ Describe the structural practices to divert flows from exposed soils, store flows or otherwise limit runoff and the discharge of pollutants from exposed areas of the project site to the degree attainable.
- ☐ Discuss the on-site availability of temporary sediment control materials (materials kept for temporary sediment control BMPs) and proposed mobilization and implementation of temporary sediment control BMPs in the event of a predicted storm. A minimum of 10% of the installed quantities of sediment control BMPs is required to be maintained onsite as standby sediment control BMPs that may be installed to prevent sediment discharges from exposed portions of the site shall be stored on site.
- Temporary structural practices may include but are not limited to:
  - ☐ Silt fences
  - ☐ Earth dikes
  - ☐ Drainage swales
  - ☐ Sediment traps
  - ☐ Check dams
  - ☐ Subsurface drains
  - ☐ Pipe slope drains
  - ☐ Storm drain inlet protection
  - ☐ Rock outlet inspection
  - ☐ Temporary sediment basins
- Permanent structural practices may include but are not limited to:



- ☐ Reinforced soil retaining systems
- ☐ Gabions
- ☐ Permanent detention or sediment basins
- Placement of structural practices in floodplains should be avoided to the degree attainable
- Installation of these devices may be subject to Section 404 of the Clean Water Act.
- For drainage locations serving an area more than ten (10) acres disturbed:
  - ☐ Where attainable, a temporary or permanent sediment basin, or equivalent control measures, shall be provided until final stabilization of the site.
    - This basin shall provide storage for a calculated volume of runoff from a 2-year, 24-hour storm from each disturbed acre drained.
    - Where no such calculation has been performed, the basin shall provide 3,600 cubic feet of storage per acre drained.
  - ☐ Where a temporary or permanent sediment basin, or equivalent control measures, are not attainable, smaller sediment basins and/or sediment traps should be used.
  - ☐ Where neither sediment basin nor equivalent controls are attainable due to site limitations, silt fences, vegetative buffer strips, or equivalent sediment controls are required for all down slope boundaries of the construction area and for those side slope boundaries deemed appropriate as dictated by individual site conditions.
- For drainage locations serving an area less than ten (10) acres disturbed:
  - ☐ Smaller sediment basins and/or sediment traps should be used.
  - ☐ At a minimum, silt fences, vegetative buffer strips, or equivalent sediment controls are required for all down slope boundaries (and those side slope boundaries deemed appropriate as dictated by individual site conditions) of the construction area unless a sediment basin providing storage for a calculated volume of runoff from a 2-year, 24-hour storm or 3,600 cubic feet of storage per disturbed acre drained is provided.
- When computing the number of acres draining into a common location it is not necessary to include flows from offsite areas or onsite areas that are either undisturbed or have undergone final stabilization where such flows are diverted around both the disturbed area and the sediment basin.
- In determining whether installing a sediment basin is attainable, the Permittee may consider factors such as site soils, slope, available onsite area, etc. Public safety, especially as related to children, must be considered as a design factor for the sediment basin and alternative sediment controls shall be used where site limitations would preclude a safe design.
- Wind erosion control BMPs shall be considered and implemented year-round and throughout the duration of the project on all disturbed soils on the project site that are subject to wind erosion, and when significant wind and dry conditions are anticipated during project construction. The objective of wind controls is to prevent the transport of soil from soil-disturbed areas of the project site, offsite by wind.

**EXAMPLE:**

Sediment controls are structural measures that are intended to complement and enhance the soil stabilization (erosion control) measures and reduce sediment discharges from construction areas. Sediment controls are designed to intercept and filter out soil particles that have been detached and transported by the force of water. This project will incorporate minimum temporary sediment control requirements, and other temporary sediment control measures required by the contract documents or selected by the contractor.

Sufficient temporary sediment control materials will be maintained on-site throughout the duration of the project, to allow implementation of temporary sediment controls in the event of predicted rain, and for rapid response to failures or emergencies, in conformance with other NDOT requirements and as described in this SWPPP. This includes implementation requirements for active areas and non-active areas before the onset of rain.

Implementation and locations of temporary sediment control BMPs are shown on the BMP Site Plans in Attachment B. The BMP Consideration Checklist in Attachment C indicates all the BMPs that will be implemented to control sediment on the construction site; these are:

- SC-1, Silt fence
- SC-4, Check dams
- SC-5, Fiber rolls
- SC-7, Street Sweeping and Vacuuming
- SC-8, Sandbag barrier
- SC-10, Storm Drain Inlet Protection

**Implementation of Temporary Sediment Controls**

- Temporary sediment control BMPs will be deployed according to the schedule shown in SWPPP Section 300.2.
- During the rainy/snow season, temporary sediment controls will be implemented at the draining perimeter of disturbed soil areas, at the toe of slopes, at storm drain inlets and at outfall areas at all times.
- During the non-rainy/snow season, temporary sediment controls will be implemented at the draining perimeter of disturbed soil areas and at the storm drain downstream from disturbed areas before rain events.
- As shown on the BMP Site Plans, silt fences will be deployed along the toe of exterior slopes to filter storm water runoff.
- Storm drain inlet protection will be used at all operational internal inlets to the storm drain system during the rainy season as shown on the BMP Site Plans.
- During the non-rainy/snow season, in the event of a predicted storm, the following temporary sediment control materials will be maintained on-site: silt fence materials, sandbags for linear barriers, fiber rolls



**REQUIRED TEXT:**

Sediment controls are structural measures that are intended to complement and enhance the selected soil stabilization (erosion control) measures and reduce sediment discharges from construction areas. Sediment controls are designed to intercept and settle out soil particles that have been detached and transported by the force of water. This project will incorporate minimum temporary sediment control requirements and other temporary sediment control measures required by the contract or selected by the contractor.

Sufficient temporary sediment control materials will be maintained on-site throughout the duration of the project to allow implementation of temporary sediment controls in the event of predicted rain or snow, and for rapid response to failures or emergencies, in conformance with NDEP and as described in this SWPPP. This includes implementation requirements for active areas and non-active areas before the onset of rain.

Implementation and locations of temporary sediment control BMPs are shown on the BMP Site Plans in Attachment B. The BMP Consideration Checklist in Attachment C indicates all the BMPs that will be implemented to control sediment on the construction site; these practices will be used to divert flows from exposed soils, store flows or otherwise limit runoff and the discharge of pollutants from exposed areas of the project site to the degree attainable. Temporary sediment control BMPs are listed below.

- SC-1, Silt Fence and/or SC-5, Fiber Rolls
- SC-7, Street Sweeping and Vacuuming
- SC-8, Storm Drain Inlet Protection
- LIST
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INSERT ADDITIONAL NARRATIVE TEXT OF SEDIMENT CONTROLS HERE OR DELETE THIS LINE (Use the "FORMAT OPTIONS" button to insert subtitles and/or paragraphs)

### 500.2.3 Offsite Vehicle Tracking and On-site Dust Controls

**INSTRUCTIONS:**

- ☐ Show and discuss selected temporary BMPs that will be implemented to prevent tracking or deposition of sediments off-site and measures that will be used to remove any sediments that have been deposited on the paved roadways bordering the site.

- ☐ Describe BMPs that will be implemented to minimize the generation of dust from construction activities on the site.

### **EXAMPLE:**

#### ***Stabilized Construction Entrance/Exit***

- A stabilized construction entrance/exit will be constructed and maintained at construction site entrances and exits, equipment yard, PCC batch plants and crushing plants, water filling area for water trucks, and project office location as shown on the site map.
- The site entrance/exit will be stabilized to reduce tracking of sediment as a result of construction traffic. The entrance will be designated and graded to prevent runoff from leaving the site. Stabilization material will be 3 to 6-inch aggregate. The entrance will be flared where it meets the existing road to provide an adequate turning radius. During dirt-hauling activities that extend over a one-week time period, a site entrance/exit will be installed to reduce tracking of sediment.

#### ***Stabilized Construction Roadway***

- The construction roadway through the site will also be designated and stabilized to prevent erosion and to control tracking of mud and soil material onto adjacent roads. The roadway will be clearly marked for limited speed to control dust. Refer to the BMP Site Plans for entrance/exit and construction roadway locations. Stabilization material will be 3 to 6-inch aggregate. A regular maintenance program will be conducted to replace sediment-clogged stabilization material with new stabilization material.

#### ***Road Cleaning BMPs – Street Sweeping and Vacuuming***

Road sweeping and vacuuming will occur during soil hauling and as necessary to keep streets clear of soil and debris. Washing of sediment tracked onto streets into storm drains will not occur.

#### **Dust Control**

- Potable water will be applied to disturbed soil areas of the project site to control dust and maintain optimum moisture levels for compaction. The water will be applied using water trucks. As shown on the project schedule, project soils will be disturbed and exposed from approximately May 1 through December 15. Water applications will be concentrated during the late summer and early fall months and especially during the embankment construction operations scheduled for July. The total water to be applied is expected to be between 106,000 and 175,000 ft<sup>3</sup>.
- BMP SS-13, Wind Erosion Control, and BMP NS-1, Water Conservation Practices, will be implemented to provide dust control and prevent discharges from dust control activities and water supply equipment. Water application rates will be minimized as necessary to prevent runoff and ponding and water equipment leaks will be repaired immediately.
- During windy conditions (forecast or actual wind conditions of approximately 25 mph or greater), dust palliatives will be applied to DSAs, including haul roads to adequately control wind erosion.
- BMP WM-3, Stockpile Management, using silt fences and plastic covers will be implemented to prevent wind dispersal of sediment from stockpiles.



**REQUIRED TEXT:**

The following measures will be installed during the construction process to prevent offsite vehicle tracking of sediments and minimize dust generation:

- LIST

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INSERT ADDITIONAL NARRATIVE TEXT OF TRACKING CONTROLS HERE OR DELETE THIS LINE (Use the "FORMAT OPTIONS" button to insert subtitles and/or paragraphs)

### 500.3 Other Controls

**INSTRUCTIONS:**

- Describe control measures that will be provided ensure that no solids materials, including building materials, shall be discharged to waters of the United States, except as authorized by a permit issued under Section 404 of the Clean Water Act.
- Describe control measures that will be provided to prevent offsite vehicle tracking of sediments and minimize dust generation.
- This SWPPP shall be consistent with applicable State, and/or local waste disposal, sanitary sewer or septic system regulations to the extent these are located within the permitted area.
- Describe construction and waste materials expected to be stored onsite with updates as appropriate. Also include a description of controls to reduce pollutants from these materials, storage practices to minimize exposure of the materials to stormwater, and procedures for spill prevention and response.
- Describe pollutant sources from areas other than construction (include stormwater discharges from dedicated asphalt and dedicated concrete plants), as well as the control measures that will be implemented at those sites to minimize pollutant discharges.

#### 500.3.1 Non-Stormwater Discharges

**INSTRUCTIONS:**

- Sources of non-stormwater, except for flows from fire-fighting activities, that are combined with stormwater discharges associated with construction activity must be identified in the SWPPP. Sources of non-stormwater include:
  - Fire hydrant flushings
  - Waters used to wash vehicles where detergents are not used
  - Water used to control dust
  - Potable water sources including waterline flushings
  - Routine external building wash down which does not used detergents

- Pavement wash waters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and where detergents are not used
  - Air conditioning condensate
  - Uncontaminated ground water or spring water
  - Foundation or footing drains where flows are not contaminated with process material such as solvents
- The SWPPP shall identify and ensure implementation of appropriate pollution prevention measures for the non-stormwater component(s) of the discharge.
- Non-storm water discharges into storm drainage systems or waterways, which are not authorized under the General Permit or authorized under a separate NPDES permit, are prohibited. Examples of prohibited discharges common to construction activities include:
- Vehicle and equipment wash water, including concrete washout water
  - Slurries from concrete cutting and coring operations, PCC grinding or AC grinding operations
  - Slurries from concrete or mortar mixing operations
  - Blast residue from high-pressure washing of structures or surfaces
  - Wash water from cleaning painting equipment
  - Runoff from dust control applications of water or dust palliatives
  - Sanitary and septic wastes
  - Chemical leaks and/or spills of any kind including but not limited to petroleum, paints, cure compounds, etc.
- Discharges of construction materials and wastes, such as fuel or paint, resulting from dumping, spills, or direct contact with rainwater or storm water runoff are also prohibited and shall be addressed in Section 500.4.2, Waste Management and Materials Pollution Control.
- Use the following process to identify, quantify, and select BMPs for non-storm water discharges. List each potential non-storm water discharge and provide the information addressed by each step. Complete the BMP Consideration Checklist in Attachment C to show selected BMPs.
- ☐ Identify all potential non-storm water discharges within the project. Examine all project activities and determine what discharges will be generated or may be required in order to complete each activity, including mobile-type operations. Discuss how mobile operations, such as maintenance and fueling for large or stationary equipment, will be addressed. Examples of common construction activities that may result in non-storm water discharges on a project are:
- vehicle and equipment cleaning, fueling and maintenance
  - surface water diversions,
  - dewatering operations
  - saw-cutting
  - drilling
  - boring



- AC and PCC grinding
- AC and PCC recycling
- concrete mixing
- crushing
- bridge cleaning
- blasting
- painting
- hydro-demolition
- mortar mixing
- air-blown mortar, etc.

- ☐ Describe each planned non-storm water discharge from the project into the storm drain system or waterway, including flow/quantity and expected pollutants. If a flow or quantity cannot be determined, then fully describe the nature and extent of the activity such that the quantity can be inferred. One-time discharges shall be monitored by the Contractor's representative during the time that such discharges are occurring.
- ☐ Describe each non-storm water source or activity that may generate a discharge; containment facilities and appurtenances that would be employed; and flow paths of discharge to downstream inlets, drainage facilities, and receiving waters. Where possible, depict BMP locations on the BMP Site Plans.
- ☐ Indicate the time period and frequency of each activity that generates or may generate a discharge.
- ☐ Describe mandatory non-storm water control BMPs and practices required by NDOT, NDEP, other permits, or other federal, state, or local agencies. Provide details and schedules as appropriate. Include maintenance, inspection, testing, and reporting requirements. Provide permit information for discharges covered by a separate NPDES permit.
- ☐ Describe contractor-selected non-storm water control BMPs and practices to minimize, contain, and dispose prohibited discharges or to minimize adverse impacts of authorized discharges from the project into the storm drain system or waterway. BMPs within both the Non-Storm Water Management and the Materials Handling and Waste Management categories may be applicable to non-storm water discharges. Include maintenance, inspection, testing, and reporting procedures, if applicable.
- ☐ Indicate how illicit connections and illegal discharges will be handled.

### **EXAMPLE:**

The BMP Consideration Checklist in Attachment C and the following list indicates the BMPs that have been selected to control non-storm water pollution on the construction site. Implementation and locations of some non-storm water control BMPs are shown on the BMP Site Plans in Attachment B. A narrative description of each BMP follows.

- NS-1, Water Conservation Practices

- NS-3, Paving and Grinding Operations
- NS-6, Illicit Connection/Illegal Discharge Detection and Reporting
- NS-8, Vehicle and Equipment Cleaning
- NS-9, Vehicle and Equipment Fueling
- NS-10, Vehicle and Equipment Maintenance
- NS-11, Pile Driving Operations
- NS-12, Concrete Curing
- NS-13, Material and Equipment Use over Water
- NS-14, Concrete Finishing
- NS-15, Structure Demolition/Removal
- WM-08, Concrete Waste Management

#### **Illicit Connection/Illegal Discharge Detection and Reporting**

- The contractor will implement BMP NS-6, Illicit Connection/Illegal Discharge Detection and Reporting throughout the duration of the project.

#### **Paving Operations**

- The project will include placement of approximately 861,000 ft<sup>2</sup> of AC pavement. Paving locations and adjacent storm drain inlets are shown on BMP Site Plans 2, 3, and 5. Paving operations will generally be conducted in August and September as shown on the project schedule in Section 300.4. BMP NS-3, Paving and Grinding Operations, will be implemented to prevent paving materials from being discharged off-site. Covers will be placed over each inlet adjacent to paving operations. The covers will consist of scrap carpeting placed over, and tucked under, each inlet grate. Following paving operations, the area will be swept, inlet covers will be removed, and the inlets will be inspected for paving materials.

#### **Vehicle and Equipment Operations**

- Several types of vehicles and equipment will be used on-site throughout the project, including graders, scrapers, excavators, loaders, paving equipment, rollers, trucks and trailers, backhoes, forklifts, generators, compressors, and traffic control equipment. BMPs NS-9, Vehicle and Equipment Fueling, and NS-10, Vehicle and Equipment Maintenance will be utilized to prevent discharges of fuel and other vehicle fluids. Except for concrete washout, which is addressed in Section 500.4.2, vehicle cleaning will not be performed on-site.
- A paved temporary fueling area will be constructed in the contractor's yard as shown on WPCD-4. All self-propelled vehicles will be fueled off-site or at the temporary fueling area. Fuel trucks, each equipped with absorbent spill clean-up materials, will be used for all on-site fueling, whether at the temporary fueling area or for mobile fueling elsewhere on the site. Drip pans will be used for all mobile fueling. The fueling truck will be parked on the paved fueling area for overnight storage.
- Drip pans or absorbent pads will be used for all vehicle and equipment maintenance activities that involve grease, oil, solvents, or other vehicle fluids.



- All vehicle maintenance and mobile fueling operations will be conducted at least 50 ft away from operational inlets and drainage facilities and on a level graded area.

#### **Concrete Saw-cutting**

- The project will include approximately 1,150 ft of concrete saw-cutting at the on- and off-ramp project limits where traffic signal and ramp metering detection loops will be installed. Saw-cutting locations and adjacent storm drain inlets are shown on BMP Site Plans 2, 3, and 4. Estimated saw-cutting dates are shown on the schedule in Section 300.4. Saw-cutting operations will not be conducted during or immediately prior to rainfall events. Saw-cutting operations are expected to produce about 53 ft<sup>3</sup> of waste slurry consisting of water and fine PCC grit.
- BMP WM-08, Concrete Waste Management, will be implemented to contain and dispose of saw-cutting slurries. The slurry will be vacuumed and discharged to the concrete washout facility described above. Dried and cured concrete wastes will be disposed off-site during concrete washout maintenance activities.

#### **REQUIRED TEXT:**

The following list indicates the appropriate pollution prevention measures that have been selected to control non-stormwater pollution on the construction site. Implementation and locations of some non-stormwater control BMPs follows.

- NS-1, Water Conservation Practices
- NS-6, Illicit Connection/Illegal Discharge Detection and Reporting
- NS-8, Vehicle and Equipment Cleaning
- NS-9, Vehicle and Equipment Fueling
- NS-10, Vehicle and Equipment Maintenance
- LIST
- 
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INSERT ADDITIONAL NARRATIVE TEXT OF NON-STORMWATER DISCHARGES CONTROL MEASURES HERE OR DELETE THIS LINE (Use the "FORMAT OPTIONS" button to insert subtitles and/or paragraphs)

The following measures will be installed during the construction process to minimize pollutant discharges from areas other than construction (including stormwater discharges from dedicated asphalt and dedicated concrete plants):

■ LIST

■

■

INSERT ADDITIONAL NARRATIVE TEXT OF NON-STORMWATER DISCHARGES CONTROL MEASURES HERE OR DELETE THIS LINE (Use the "FORMAT OPTIONS" button to insert subtitles and/or paragraphs)

### 500.3.2 Waste Management and Materials Pollution Control

<b>INSTRUCTIONS:</b>
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- Waste management consists of implementing procedural and structural BMPs for collecting, handling, storing and disposing of wastes generated by a construction project to prevent the release of waste materials into storm water discharges. Wastes are going to be generated during construction; however, the methods in which the wastes are collected, stored, and removed will determine the success of the waste management activities. Construction site wastes can range from residues collected from non-storm water discharges (i.e. paint removal) to general site litter and debris (i.e. empty marker paint cans).
- Materials pollution control (materials handling) consist of implementing procedural and structural BMPs for handling, storing and using construction materials to prevent the release of those materials into storm water discharges. The amount and type of construction materials to be utilized at the site will be dependent upon the type of construction and the length of the construction period. The materials may be used continuously, such as fuel for vehicles and equipment, or the materials may be used for a discrete period, such as fertilizer for landscaping.
- Waste management and materials pollution control BMPs shall be implemented to minimize storm water contact with construction materials, wastes and service areas, and to prevent materials and wastes from being discharged off-site. The primary mechanisms for storm water contact that shall be addressed are:
  - Direct contact with precipitation
  - Contact with storm water run-on and runoff
  - Wind dispersion of loose materials
  - Direct discharge to the storm drain system through spills or dumping
- Extended contact with some materials and wastes, such as asphalt cold mix and treated wood products can also leach pollutants into storm water.
- Use the following process to identify and select BMPs for waste management and materials pollution control.
  - ☐ Review construction activities to identify and quantify likely construction materials and wastes. Identify materials and wastes with special handling or disposal requirements such as lead contaminated soils, concrete saw-cutting liquids, waste chemicals and empty chemical containers. (See Section 500.3.1)



- ☐ Substitute safer, less polluting products where possible. Substitution of materials and products require approval pursuant to the Standard Specifications.
- ☐ Use the BMP Consideration Checklist in Attachment C to identify NDOT minimum requirements and additional BMPs selected to address project-specific activities.
- ☐ List the selected BMPs and describe proposed facilities for materials storage and waste management (including on-site storage and disposal of waste). Discuss how each storm water contact mechanism will be addressed. Include schedules, inspection, and maintenance requirements. Show facility locations and details on the BMP Site Plans where possible.
- ☐ Describe proposed waste collection and removal schedules.

### **EXAMPLE:**

The BMP Consideration Checklist in Attachment C and the following list indicates the BMPs that have been selected to control construction site wastes and materials. Implementation and locations of some materials handling and waste management BMPs are shown on the BMP Site Plans in Attachment B. A narrative description of each BMP follows.

- WM-1, Material Delivery and Storage
- WM-2, Material Use
- WM-3, Stockpile Management
- WM-4, Spill Prevention and Control
- WM-5, Solid Waste Management
- WM-6, Hazardous Waste Management
- WM-8, Concrete Waste Management

#### **Material Delivery, Storage, and Use**

- In general, BMPs WM-1 and WM-2 will be implemented to help prevent discharges of construction materials during delivery, storage, and use. The general material storage area will be located in the contractor's yard as shown on WPCD-4. A sandbag barrier (BMP SC-8) will be provided around the storage area to prevent run-on from adjacent areas. Two types of storage/containment facilities will be provided within the storage area to minimize storm water contact with construction materials:
  - Two watertight shipping containers will be used to store hand tools, small parts, and most construction materials that can be carried by hand, such as paint cans, solvents and grease.
  - A separate covered storage/containment facility will be constructed adjacent to the shipping containers to provide storage for larger items such as drums and items shipped or stored on pallets. The containment facility will consist of a 10 ft by 20 ft raised concrete pad with 4 inch curbed sides. A wood frame and corrugated tin roof and sides will be constructed to protect the facility from sun and rain. The facility will provide about 530 gal of containment volume. The containment volume is adequate to store 9, 55-gallon drums and the rainfall from a 24-hr, 25-year storm, pursuant to BMP WM-1.



- Very large items, such as light standards, framing materials, and stockpiled lumber, will be stored in the open in the general storage area. Such materials will be elevated with wood blocks to minimize contact with run-on.
- Spill clean-up materials, material safety data sheets, a material inventory, and emergency contact numbers will be maintained and stored in the southern shipping container.

#### **Stockpile Management**

- BMP WM-3, Stockpile Management, will be implemented to reduce or eliminate pollution of storm water from stockpiles of soil and paving materials such as portland cement concrete (PCC) rubble, asphalt concrete (AC), asphalt concrete rubble, aggregate base, aggregate subbase, pre-mixed aggregate and asphalt minder (so called "cold mix" asphalt). Stockpiles will be surrounded with sediment controls (SC-5, Fiber Rolls or SC-8, Sandbag Barrier). Plastic covers (SS-7, Geotextiles, Plastic Covers, & Erosion Control Blankets/Mats), or SS-5, Soil Binders, will be used.

#### **Spill Prevention and Control**

- BMP WM-4, Spill Prevention and Control, will be implemented to contain and clean-up spills and prevent material discharges to the storm drain system. Spill prevention is also discussed above in Material Delivery, Storage, and below in the following waste management and equipment maintenance sections.

#### **Waste Management**

- BMP WM-5, Solid Waste Management, and BMP WM-6, Hazardous Waste Management will be implemented to minimize storm water contact with waste materials and prevent waste discharges. Solid wastes will be loaded directly into trucks for off-site disposal. When on-site storage is necessary, solid wastes will be stored in watertight dumpsters in the general storage area of the contractor's yard. Dumpster locations are shown on WPCD-4. AC and PCC rubble will be stockpiled in the general storage area, will be surrounded with sediment controls (SC-8, Sandbag Barrier), and covered when necessary. Solid waste, including rubble stockpiles, will be removed and disposed off-site at least weekly. ABC Waste Disposal (License NV9999999) will provide solid waste disposal services. Hazardous wastes will be stored in the shipping containers or covered containment area discussed above for materials storage. Hazardous wastes will be appropriate and clearly marked containers and segregated from other non-waste materials.

#### **Contaminated Soil Management**

- When contaminated soils are encountered, NDOT will be notified, the contaminated soils will be contained, covered if stockpiled, and disposed of per WM-7, Contaminated Soil Management, and the *Construction Site BMPs Manual*. Employees will be instructed to recognize evidence of contaminated soil, such as buried debris, discolored soil, and unusual odors.

#### **Concrete Residuals and Washout Wastes**

- This project includes placement of about 3,500 ft<sup>3</sup> of concrete in four separate pours, the largest pour being approximately 1,400 ft<sup>3</sup>. The estimated maximum washout volume is 3.5 ft<sup>3</sup>. Discharges will



consist of rinse water and residual concrete (Portland cement, aggregates, admixture, and water). Estimated pour dates are shown on the project schedule in Section 300.4. Concrete pours will not be conducted during or immediately prior to rainfall events.

- BMP WM-8, Concrete Waste Management, will be implemented and a below grade concrete washout facility with a 10mil PVC liner will be constructed and maintained at the contractor's yard as shown on WPCD-4. All excess concrete and concrete washout slurries will be discharged to the washout facility for drying. The minimum-sized washout, at 10 ft x 10 ft x 3 ft deep, will provide more than sufficient volume to contain concrete washout wastes and waste collected from concrete saw-cutting operations, discussed below. BMP maintenance, waste disposal, and BMP removal will be conducted as described in WM-8. Dried-off concrete will be used as fill material if permitted by the RE.
- Concrete waste solids/liquids will be removed and disposed of as required by WM-8 and the *Construction Site BMPs Manual*.

#### **Sanitary and Septic Wastes**

- The contractor will implement BMP WM-9, Sanitary and Septic Waste Management, and portable toilets will be located and maintained at the contractor's yard for the duration of the project. Specific locations are shown on WPCD-4. Weekly maintenance will be provided each Wednesday by ABC Sanitation (license NV0Q45W) and wastes will be disposed off-site. The toilets will be located away from concentrated flow paths and traffic flow.

#### **REQUIRED TEXT:**

The BMP Consideration Checklist in Attachment C and the following lists indicate the BMPs that have been selected to handle materials and control construction site wastes. Implementation and locations of some materials handling and waste management BMPs are shown on the BMP Site Plans in Attachment B. A narrative description of each BMP is also included at the end of this section.

The following measures will be installed during the construction process to ensure that no solids materials, including building materials, shall be discharged to waters of the United States, except as authorized by a permit issued under Section 404 of the Clean Water Act:

- WM-1, Material Delivery and Storage
- WM- 2, Material Use
- LIST
- 
- 

The following measures will be installed to make this SWPPP consistent with applicable State, and/or local waste disposal, sanitary sewer or septic system regulations to the extent these are located within the permitted area:

- WM-4, Spill Prevention and Control
- WM-5, Construction Litter and Debris Management
- WM-9, Sanitary/Septic Waste Management
- LIST
- 
- 

The following measures will be installed during the construction process to reduce pollutants from construction and waste materials expected to be stored onsite, with updates as appropriate:

- WM-1, Material Delivery and Storage
- WM- 2, Material Use
- WM-3, Stockpile Management
- WM-4, Spill Prevention and Control
- LIST
- 
- 

INSERT ADDITIONAL NARRATIVE TEXT OF WASTE MANAGEMENT AND MATERIALS POLLUTION CONTROL PRACTICES HERE OR DELETE THIS LINE (Use the "FORMAT OPTIONS" button to insert subtitles and/or paragraphs)

## 500.4 Maintenance and Inspection

### **INSTRUCTIONS:**

- Maintenance shall be performed before the next anticipated storm event, or as necessary to maintain the continued effectiveness of stormwater controls. If maintenance prior to the next anticipated storm event is impracticable, maintenance must be scheduled and accomplished as soon as practicable.
- A checklist is required during each inspection. A Storm Water Quality Construction Site Inspection Checklist is included as Attachment H. This checklist shall be used for all inspections unless the *Construction Site BMPs Manual* requires the Contractor to use a different checklist.
- The purpose of storm water inspections is to evaluate BMP effectiveness and implement repairs or design changes as soon as feasible.
- Inspections shall be completed by the Contractor's representative.



- Inspections are recommended on a regular basis during dry weather. The purpose of dry-weather inspections is to ensure proper implementation of BMPs that are not necessarily weather-related. Examples include non-storm water, waste management, and sediment tracking control BMPs.
- A sample maintenance, inspection, and repair program is shown in Attachment G.
- A checklist is required during each inspection. A Storm Water Quality Construction Site Inspection Checklist is included as Attachment H in Appendix A. This checklist shall be used for all inspections unless the *Construction Site BMPs Manual* requires the Contractor to use a different checklist.
- Qualified personnel (provided by the Permittee or cooperative Permittees) shall inspect for evidence of, or potential for, pollutants entering the drainage system from disturbed areas of the construction site that have not been finally stabilized, areas used for material storage that are exposed to precipitation, structural control measures, and locations where vehicles enter or exit the site:
  - ☐ Once every seven (7) calendar days, and
  - ☐ Within 24 hours of the end of a storm event of 0.5 inches or greater
- Permittees are eligible for a waiver of weekly inspections until one month before thawing conditions are expected to result in a discharge if all of the following conditions are met:
  - The project is located in an area where frozen conditions continue for extended periods of time (i.e., more than one month)
  - Land disturbance activities have been suspended
  - Beginning and ending dates of the waiver period are documented in the SWPPP
- Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.
- Where discharge locations or points are inaccessible, nearby downstream locations shall be inspected to the extent that such inspections are practicable.
- The SWPPP shall retain for at least three years from the date the site is finally stabilized a report summarizing the scope of the inspection, name(s) and qualifications of personnel conducting the inspection, date(s) of the inspection, and major observations relating to the implementation of the SWPPP, and actions taken.
- The SWPPP shall be modified as necessary to include additional or modified BMPs designed to correct the problems identified. Revisions shall be completed within seven (7) calendar days following the inspection. Implementation of necessary additional BMPs or BMP modifications shall be completed within seven (7) days following receipt of the inspection results or prior to the next anticipated storm event, whichever is sooner.
- A tracking or follow-up procedure shall follow any inspection that identifies deficiencies in BMPs.
  - ☐ Include a discussion of the program to inspect and maintain all BMPs as identified in the site plan or other narrative documents throughout the duration of the project. Insert the complete program as Attachment G.

**REQUIRED TEXT**

Inspections will be conducted as follows:

- Once every seven (7) calendar days, and



- Within 24 hours of the end of a storm event of 0.5 inches or greater

The SWPPP shall be modified as necessary to include additional or modified BMPs designed to correct the problems identified during inspection. Revisions shall be completed within seven (7) calendar days following the inspection. Implementation of necessary additional BMPs or BMP modifications shall be completed within seven (7) days following receipt of the inspection results or prior to the next anticipated storm event, whichever is sooner. Copies of the completed inspection reports, reports of noncompliance, or certification of compliance will be kept with the SWPPP. All SWPPP documents will be kept for three years. A program for Maintenance, Inspection and Repair of BMPs is shown in Attachment G

#### **500.4.1 Discharge Reporting**

##### **INSTRUCTIONS:**

- Discharges will be reported to the NDOT verbally upon discovery and in writing within 7 days of occurrence. A sample form for reporting discharges is shown in Attachment I.
- The SWPPP shall retain for at least three years from the date the site is finally stabilized a report summarizing the scope of the inspection, name(s) and qualifications of personnel conducting the inspection, date(s) of the inspection, and major observations relating to the implementation of the SWPPP, and actions taken. Incidents of noncompliance shall be identified, or certification of compliance shall be included. Major observations should include:
  - Location(s) of discharges of sediment or other pollutants from the site
  - Location(s) of BMPs that need to be maintained
  - Location(s) of BMPs that failed to operate as designed, or are inadequate for a location
  - Location(s) where additional BMPs are needed that did not exist at the time of inspection

##### **REQUIRED TEXT:**

If an unauthorized discharge occurs or if the project receives a written notice or order from any regulatory agency, the contractor will immediately notify NDOT, and will file a written report to NDOT within 7 days of the discharge event, notice, or order. Corrective measures will be implemented immediately following the discharge, notice or order. A sample discharge form is provided in Attachment I.

The report to NDOT will contain the following items:

- The date, time, location, nature of operation, and type of unauthorized discharge, including the cause or nature of the notice or order,
- The control measures (BMPs) deployed before the discharge event, or prior to receiving notice or order,



- The date of deployment and type of control measures (BMPs) deployed after the discharge event, or after receiving the notice or order, including additional measures installed or planned to reduce or prevent re-occurrence, and
- An implementation and maintenance schedule for any affected BMPs

#### **500.4.2 Record Keeping and Reports**

##### **REQUIRED TEXT:**

Records shall be retained for a minimum of three years for the following items:

- Site inspections
- Discharge reports
- SWPPP document and amendments

Upon contract completion, a copy of the SWPPP and all updates and amendments will be provided to NDOT.

#### **500.5 Permanent Stormwater Management**

##### **INSTRUCTIONS:**

- Post-Construction BMPs are permanent stormwater management measures installed during construction, designed to reduce or eliminate pollutant discharges from the site after construction is completed.
- Describe measures that will be installed during construction to control pollutants in stormwater discharges that will occur after construction activities are completed. Structural measures should be placed on upland soils to the degree attainable. Installation of these devices may also require a separate permit under Section 404 of the Clean Water Act.
- Permittees are only responsible for installation and maintenance of stormwater management measures prior to final site stabilization. They are not responsible for maintenance after stormwater discharges associated with construction activity have been eliminated from the site.
- Post-construction stormwater BMPs that discharge pollutants from point sources once construction is completed may need authorization under a separate NPDES permit. Such practices may include but are not limited to:
  - Stormwater detention structures (including wet ponds)
  - Stormwater retention structures
  - Flow attenuation by open vegetated swales and natural depressions
  - Onsite runoff infiltration
  - Sequential systems (which combine practices).

This SWPPP shall include an explanation of the technical basis used to select practices to control pollution where flows exceed predevelopment levels.

- ☐ Velocity dissipation devices shall be placed at discharge locations and along the length of outfall channels to provide a non-erosive flow velocity from the structure to a watercourse so that natural physical and biological characteristics and functions are maintained and protected.
  
- ☐ Provide descriptions of the BMPs employed after all construction phases have been completed at the site (Post-Construction BMPs). Examples of post-construction measures are:
  - infiltration basins,
  - detention/retention devices,
  - vegetated strips and/or swales,
  - biofilters
  - permanent erosion control, seeding and planting,
  - outlet protection/velocity dissipation devices,
  - earth dikes, drainage swales, and lined ditches,
  - bridge slope protection,
  - rock slope protection,
  - mulching,
  - verification that interior drains are not connected to a storm sewer system.

#### **EXAMPLE:**

The following are the post-construction BMPs that are to be used at this construction site after all construction is complete:

- Outlet protection/velocity dissipation devices at all culvert outlets.
- Rock slope protection in slopes under and adjacent to all bridges.
- All other slopes will be seeded, planted and protected with wood mulch.
- Numerous vegetated drainage strips and swales.
- An infiltration basin.

#### **REQUIRED TEXT:**

The following measures will be installed during the construction process to control pollutants in stormwater discharges that occur after construction activities are completed:

- LIST
- 
-



INSERT ADDITIONAL NARRATIVE TEXT OF STORMWATER MANAGEMENT CONTROL PRACTICES HERE OR DELETE THIS LINE (Use the "FORMAT OPTIONS" button to insert subtitles and/or paragraphs)

## **500.6    Approved State or Local Plans**

### **INSTRUCTIONS:**

- ☐ The SWPPP shall be consistent with requirements specified in applicable sediment and erosion site plans or site permits, or storm water management site plans or site permits approved by State or local officials.
- ☐ The SWPPP must be updated as necessary to remain consistent with any changes applicable to protecting surface water resources in sediment and erosion site plans or site permits, or storm water management site plans or site permits approved by State or local officials for which the Permittee receives written notice.
- ☐ Provide a list of all of the other plans and permits in this section, and describe any special requirements for each permit. Insert additional bullets as needed. Delete bullets if not needed.
- ☐ Include a copy of all other plans/permits as Attachment J of the SWPPP.

### **REQUIRED TEXT:**

Attachment J includes copies of other local, state, and federal plans and permits. Following is a list of the plans and permits included in Attachment J:

- INSERT NAME(S), DATE(S) AND SOURCES OF OTHER LOCAL, STATE OR FEDERAL PLANS OR PERMITS HERE
- 
- 
-

# Attachment A

## Project Title Sheet and Vicinity Map

### **INSTRUCTIONS**

- Insert the project plans' Title Sheet and the Vicinity Map following this page.



# Attachment B

## BMP Site Plans

### *INSTRUCTIONS*

- Insert the BMP Site Plans following this page.

# Attachment C

## BMP Consideration Checklist

CONSTRUCTION SITE BMPs CONSIDERATION CHECKLIST						
The Contractor shall consider using all BMPs listed hereon. Those BMPs that are not included in the SWPPP shall be checked as "Not used" with a brief statement describing why it is not being used.						
TEMPORARY EROSION CONTROL BMPs						
BMP No.	BMP	MINIMUM REQUIREMENT <sup>(2)</sup>	CHECK IF CONTRACT REQUIREMENT	CHECK IF USED	CHECK IF NOT USED	IF NOT USED, STATE REASON
SS-1	Scheduling	✓				
SS-2	Preservation of Existing Vegetation	✓				
SS-3	Hydraulic Mulch	✓ <sup>(1)</sup>				
SS-4	Hydroseeding	✓ <sup>(1)</sup>				
SS-5	Soil Stabilizers	✓ <sup>(1)</sup>				
SS-6	Straw Mulch	✓ <sup>(1)</sup>				
SS-7	Geotextiles, Plastic Covers, & Erosion Control Blankets/Mats	✓ <sup>(1)</sup>				
SS-8	Wood Mulching					
SS-9	Earth Dikes/Drainage Swales & Lined Ditches					
SS-10	Outlet Protection/ Velocity Dissipation Devices					
SS-11	Slope Drains					
SS-12	Streambank Stabilization					
SS-13	Wind Erosion Control					

<sup>(1)</sup> The Contractor shall select one of the five measures listed or a combination thereof to achieve and maintain the contract's rainy season disturbed soil area (DSA) requirements.

<sup>(2)</sup> Not all minimum requirements may be applicable to every project. Applicability to a specific project shall be verified by the Contractor or determined by NDOT.



CONSTRUCTION SITE BMPs CONSIDERATION CHECKLIST						
The Contractor shall consider using all BMPs listed hereon. Those BMPs that are not included in the SWPPP shall be checked as "Not used" with a brief statement describing why it is not being used.						
TEMPORARY SEDIMENT CONTROL BMPs						
BMP No.	BMP	MINIMUM REQUIREMENT <sup>(2)</sup>	CHECK IF CONTRACT REQUIREMENT	CHECK IF USED	CHECK IF NOT USED	IF NOT USED, STATE REASON
SC-1	Silt Fence	✓				
SC-2	Sediment Basin					
SC-3	Sediment Trap					
SC-4	Check Dam					
SC-5	Fiber Rolls					
SC-6	Gravel Bag Berm					
SC-7	Street Sweeping and Vacuuming	✓				
SC-8	Storm Drain Inlet Protection	✓				
TRACKING CONTROL BMPs						
TC-1	Stabilized Construction Entrance/Exit					
TC-2	Stabilized Construction Roadway					
TC-3	Entrance/Outlet Tire Wash					

(2) Not all minimum requirements may be applicable to every project. Applicability to a specific project shall be verified by the Contractor or determined by NDOT.

CONSTRUCTION SITE BMPs CONSIDERATION CHECKLIST						
The Contractor shall consider using all BMPs listed hereon. Those BMPs that are not included in the SWPPP shall be checked as "Not used" with a brief statement describing why it is not being included.						
NON-STORM WATER MANAGEMENT BMPs						
BMP No.	BMP	MINIMUM REQUIREMENT <sup>(2)</sup>	CHECK IF CONTRACT REQUIREMENT	CHECK IF USED	CHECK IF NOT USED	IF NOT USED, STATE REASON
NS-1	Water Conservation Practices	✓				
NS-2	Dewatering Operations					
NS-3	Paving and Grinding Operations					
NS-4	Temporary Stream Crossing					
NS-5	Clear Water Diversion					
NS-6	Illicit Connection/Illegal Discharge Detection and Reporting	✓				
NS-7	Potable Water/Irrigation					
NS-8	Vehicle and Equipment Cleaning	✓				
NS-9	Vehicle and Equipment Fueling	✓				
NS-10	Vehicle and Equipment Maintenance	✓				
NS-11	Pile Driving and Drilling Operations					
NS-12	Concrete and Pavement Curing					
NS-13	Material and Equipment Use Over Water					
NS-14	Concrete Finishing					
NS-14	Material and Equipment Use Over Water					
NS-15	Structure Demolition/Removal Over or Adjacent to Water					
NS-16	Temporary Batch Plants					

(2) Not all minimum requirements may be applicable to every project. Applicability to a specific project shall be verified by the contractor or determined by NDOT.



CONSTRUCTION SITE BMPs CONSIDERATION CHECKLIST						
The Contractor shall consider using all BMPs listed hereon. Those BMPs that are not included in the SWPPP shall be checked as "Not used" with a brief statement describing why it is not being used.						
WASTE MANAGEMENT AND MATERIALS POLLUTION CONTROL BMPs						
BMP No.	BMP	MINIMUM REQUIREMENT (2)	CHECK IF CONTRACT REQUIREMENT	CHECK IF USED	CHECK IF NOT USED	IF NOT USED, STATE REASON
WM-1	Material Delivery and Storage	✓				
WM-2	Material Use	✓				
WM-3	Stockpile Management	✓				
WM-4	Spill Prevention and Control	✓				
WM-5	Construction and Litter Debris Management	✓				
WM-6	Concrete Waste Management					
WM-7	Sanitary/Septic Waste Management	✓				
WM-8	Liquid Waste Management					

(2) Not all minimum requirements may be applicable to every project. Applicability to a specific project shall be verified by the contractor or determined by NDOT.

# Attachment D

## Computation Sheet for Determining Runoff Coefficients

### INSTRUCTIONS

- The runoff coefficient ("C" value) is used to estimate the impact on stormwater runoff due to development of a site. The C value is the amount of rainfall that becomes runoff. The less runoff that is absorbed into the ground, the higher the C value.
- Refer to the local Hydrology Manual for requirements for calculating weighted runoff coefficients for areas containing varying amounts of different cover.
- Refer to the local Hydrology Manual for information of Runoff Coefficients for Undeveloped Areas and Runoff Coefficients for Developed Areas.

### REQUIRED TEXT:

Total Site Area = \_\_\_\_\_ Acres (A)

### Existing Site Conditions

Impervious Site Area <sup>1</sup> = \_\_\_\_\_ Acres (B)

Impervious Site Area Runoff Coefficient <sup>2,4</sup> = \_\_\_\_\_ (C)

Pervious Site Area <sup>3</sup> = \_\_\_\_\_ Acres (D)

Pervious Site Area Runoff Coefficient <sup>4</sup> = \_\_\_\_\_ (E)

Existing Site Area Runoff Coefficient  $\frac{(B \times C) + (D \times E)}{(A)}$  = \_\_\_\_\_ (F)

### Proposed Site Conditions (after construction)

Impervious Site Area <sup>1</sup> = \_\_\_\_\_ Acres (G)

Impervious Site Area Runoff Coefficient <sup>2,4</sup> = \_\_\_\_\_ (H)



Attachment D  
Computation Sheet for Determining Runoff Coefficients

Pervious Site Area <sup>3</sup> = \_\_\_\_\_ Acres (I)

Pervious Site Area Runoff Coefficient <sup>4</sup> = \_\_\_\_\_ (J)

Proposed Site Area Runoff Coefficient  $\frac{(G \times H) + (I \times J)}{(A)}$  = \_\_\_\_\_ (K)

1. Includes paved areas, areas covered by buildings, and other impervious surfaces.
2. Use 0.95 unless lower or higher runoff coefficient can be verified.
3. Includes areas of vegetation, most unpaved or uncovered soil surfaces, and other pervious areas.
4. Refer to local Hydrology Manual for typical C values.

# Attachment E

## Computation Sheet for Determining Run-on Discharges

### INSTRUCTIONS

- **Item A.** The runoff coefficient represents the percent of water, which will run off the ground surface during the storm. Values of the Runoff Coefficients for Undeveloped Areas and Runoff Coefficients for Developed Areas can be determined from the local Hydrology Manual.
- Refer to the local Hydrology Manual for requirements for calculating weighted runoff coefficients for areas containing varying amounts of different cover.
- **Item B.** Rainfall intensity, in inches per hour, is the average rainfall intensity for the selected frequency. Refer to the local Hydrology Manual, County Flood Control, or U. S. Army Corps of Engineers manuals for rainfall intensity values.
- **Item C.** Drainage area in Acres includes impervious and pervious areas and surfaces covered by buildings.
- SWPPP preparer shall provide calculations for offsite run-on if flow quantities are not available via the project design documents (Drainage Report, Hydrology Report, etc.)
- The rational method should not be used for drainage areas greater than 300 Acres. Check with the local Hydrology Manual for calculation requirements.

### Existing Site Conditions

Area Runoff Coefficient	=	_____	(A)
Area Rainfall Intensity	=	_____ in/hr	(B)
Drainage Area	=	_____ Acres	(C)
Site Area Run-on Discharge (A) x (B) x (C)	=	_____ ft <sup>3</sup> /sec	(D)



# Attachment F

## Notice of Intent (NOI)

### *INSTRUCTIONS*

- Insert a copy of the completed NOI after this page.

### Program for Maintenance, Inspection, and Repair of Construction Site BMPs

- Use this form as an outline for the maintenance, inspection and repair program described in SWPPP Section 500.5.
- Certain projects may require increased inspection frequencies.

<i>The contractor shall use the following guidelines for maintenance, inspection, and repair of BMPs identified in the SWPPP</i>		
<b>BEST MANAGEMENT PRACTICES (BMPs)</b>	<b>INSPECTION FREQUENCY (all controls)</b>	<b>MAINTENANCE/REPAIR PROGRAM</b>
<b>TEMPORARY EROSION CONTROL BMPs</b>		
		■ ■ ■
		■ ■ ■
<b>TEMPORARY SEDIMENT CONTROL BMPs</b>		
		■ ■ ■ ■ ■ ■
		■ ■
		■ ■ ■ ■ ■ ■



<i>The contractor shall use the following guidelines for maintenance, inspection, and repair of BMPs identified in the SWPPP</i>		
BEST MANAGEMENT PRACTICES (BMPs)	INSPECTION FREQUENCY (all controls)	MAINTENANCE/REPAIR PROGRAM
<b>TRACKING CONTROL BMPs</b>		
		■ ■ ■ ■
<b>NON-STORM WATER MANAGEMENT BMPs</b>		
		■ ■ ■ ■ ■ ■ ■
<b>WASTE MANAGEMENT AND MATERIALS POLLUTION CONTROL BMPs</b>		
		■ ■ ■ ■ ■ ■ ■
		■ ■ ■ ■

# Attachment H

## Storm Water Quality Construction Site Inspection Checklist

### INSTRUCTIONS

- Use this form for inspecting BMPs as described in SWPPP Section 500.4.
- This inspection form shall be completed and signed by the Contractor's representative.
- The weather information shall be the best estimate of beginning of the storm event, duration of the event, time elapsed since the last storm, and approximate amount of rainfall.
- List observations of all BMPs: temporary erosion controls, temporary sediment controls, wind erosion controls, tracking controls, non-storm water controls and waste management and materials pollution controls.
- Evaluate BMPs for adequacy and proper implementation and whether additional BMPs are required in accordance with the terms of the Permits.
- Verify implementation of non-storm water discharge BMPs and evaluate their effectiveness.
- One-time discharges of non-storm water shall be inspected when such discharges occur.
- Describe any inadequate BMPs.
- Note the corrective actions required, including any changes to the SWPPP, and implementation dates.
- If you answer "No" to any of the questions, describe the corrective action(s) to be taken and when the corrective action(s) are to be completed. Should you need more space to describe corrective actions, identify your response numerically and use additional sheets as necessary.

GENERAL INFORMATION	
Project Name	
Project N°	
Contractor	
Inspector's Name	
Inspector's Title	
Signature	
Date of Inspection	



GENERAL INFORMATION				
Inspection Type (Check Applicable)	<input type="checkbox"/> Prior to forecast rain <input type="checkbox"/> After a rain event <input type="checkbox"/> 24-hr intervals during extended rain <input type="checkbox"/> Other _____			
Season (Check Applicable)	<input type="checkbox"/> Rainy/Snow <input type="checkbox"/> Non-Rainy/Snow			
Storm Data	Storm Start Date & Time:		Storm Duration (hrs):	
	Time elapsed since last storm (Circle Applicable Units)	Min.    Hr.    Days	Approximate Rainfall Amount (inches)	

PROJECT AREA SUMMARY AND DISTURBED SOIL AREA (DSA) SIZE	
Total Project Area	_____ Acres                      _____ ft <sup>2</sup>
Field Estimate of Active DSAs	_____ Acres                      _____ ft <sup>2</sup>

OTHER REQUIREMENTS				
Requirement	Yes	No	N/A	Corrective Action
<b>Preservation of Existing Vegetation</b>				
Is temporary fencing provided to preserve vegetation in areas where no construction activity is planned?				
Location:				
Location:				
Location:				
Location:				
<b>Temporary Soil Stabilization</b>				
Does the applied temporary soil stabilization provide 100% coverage for the required areas?				
Are any non-vegetated areas that may require temporary soil stabilization?				
Is the area where temporary soil stabilization required free from visible erosion?				
Location:				
Location:				
Location:				
Location:				
Location:				

OTHER REQUIREMENTS				
Requirement	Yes	No	N/A	Corrective Action
<b>Temporary Sediment Barriers</b>				
Are temporary sediment barriers properly installed in accordance with the details, functional and maintained?				
Are temporary sediment barriers free of accumulated litter?				
Is the built-up sediment less than 1/3 the height of the barrier?				
Are cross barriers installed where necessary and properly spaced?				
Location:				
Location:				
Location:				
Location:				
Location:				
<b>Storm Drain Inlet Protection</b>				
Are storm drain inlets internal to the project properly protected with either Type 1, 2 or 3 inlet protection?				
Are storm drain inlet protection devices in working order and being properly maintained?				
Location:				
Location:				
Location:				
Location:				
Location:				
<b>Sediment Basins</b>				
Are basins maintained to provide the required retention/detention?				
Are basin controls (inlets, outlets, diversions, weirs, spillways, and racks) in working order?				
Location:				
Location:				
Location:				
Location:				
<b>Stockpiles</b>				
Are all locations of temporary stockpiles, including soil, hazardous waste, and construction materials in approved areas?				
Are stockpiles protected from run-on, run-off from adjacent areas and from winds?				
Are stockpiles located at least 50 ft from concentrated flows, downstream drainage courses and storm drain inlets?				
Are required covers and/or perimeter controls in place?				
Location:				
Location:				



OTHER REQUIREMENTS				
Requirement	Yes	No	N/A	Corrective Action
Location:				
Location:				
<b>Concentrated Flows</b>				
Are concentrated flow paths free of visible erosion?				
Location:				
Location:				
Location:				
Location:				
<b>Tracking Control</b>				
Are points of ingress/egress to public/private roads inspected and swept and/or vacuumed daily?				
Are all paved areas free of visible sediment tracking or other particulate matter?				
Location:				
Location:				
Location:				
Location:				
<b>Wind Erosion Control</b>				
Is dust control implemented in conformance with Section 10 of the Standard Specifications?				
Location:				
Location:				
Location:				
Location:				
<b>Dewatering Operations</b>				
Is dewatering handled in conformance with NDEP requirements?				
Is required treatment provided for dewatering effluent?				
Location:				
Location:				
Location:				
Location:				
<b>Vehicle &amp; Equipment Fueling, Cleaning, and Maintenance</b>				
Are vehicle and equipment fueling, cleaning and maintenance areas reasonably clean and free of spills, leaks, or any other deleterious material?				
Are vehicle and equipment fueling, cleaning and maintenance activities performed on an impermeable surface in dedicated areas?				
If no, are drip pans used?				

OTHER REQUIREMENTS				
Requirement	Yes	No	N/A	Corrective Action
Are dedicated fueling, cleaning, and maintenance areas located at least 50 ft away from downstream drainage facilities and watercourses and protected from run-on and runoff?				
Is wash water contained for infiltration/ evaporation and disposed of outside the highway right of way?				
Is on-site cleaning limited to washing with water (no soap, soaps substitutes, solvents, or steam)?				
On each day of use, are vehicles and equipment inspected for leaks and if necessary, repaired?				
Location:				
Location:				
Location:				
Location:				
<b>Waste Management &amp; Materials Pollution Control</b>				
Are material storage areas and washout areas protected from run-on and runoff, and located at least 50 ft from concentrated flows and downstream drainage facilities?				
Are all material handling and storage areas clean; organized; free of spills, leaks, or any other deleterious material; and stocked with appropriate clean-up supplies?				
Are liquid materials, hazardous materials, and hazardous wastes stored in temporary containment facilities?				
Are bagged and boxed materials stored on pallets?				
Are hazardous materials and wastes stored in appropriate, labeled containers?				
Are proper storage, clean-up, and spill-reporting procedures for hazardous materials and wastes posted in open, conspicuous and accessible locations adjacent to storage areas?				
Are temporary containment facilities free of spills and rainwater?				
Are temporary containment facilities and bagged/boxed materials covered?				
Are temporary concrete washout facilities designated and being used?				
Are temporary concrete washout facilities functional for receiving and containing concrete waste and are concrete residues prevented from entering the drainage system?				
Do temporary concrete washout facilities provide sufficient volume and freeboard for planned concrete operations?				
Are concrete wastes, including residues from cutting and grinding, contained and disposed of off-site or in concrete washout facilities?				
Are spills from mobile equipment fueling and maintenance properly contained and cleaned up?				
Is the site free of litter?				
Are trash receptacles provided in the Contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods?				
Is litter from work areas within the construction limits of the project site collected and placed in watertight dumpsters?				
Are waste management receptacles free of leaks?				



OTHER REQUIREMENTS				
Requirement	Yes	No	N/A	Corrective Action
Are the contents of waste management receptacles properly protected from contact with storm water or from being dislodged by winds?				
Are waste management receptacles filled at or beyond capacity?				
Location:				
Location:				
Location:				
Location:				
<b>Temporary Water Body Crossing or Encroachment</b>				
Are temporary water body crossings and encroachments constructed as shown on the plans or as approved by the engineer?				
Does the project conform to the requirements of the 404 Permit and/or 1601 Agreement?				
Location:				
Location:				
Location:				
Location:				
<b>Illicit Connection/Illegal Discharge Detection and Reporting</b>				
Is there any evidence of illicit discharges or illegal dumping on the project site?				
If yes, has the Engineer been notified?				
Location:				
Location:				
Location:				
Location:				
<b>Discharge Points</b>				
Are discharge points and discharge flows free from noticeable pollutants?				
Are discharge points free of any significant erosion or sediment transport?				
Location:				
Location:				
Location:				
Location:				
<b>SWPPP Update</b>				
Do the SWPPP, Pollution Prevention Implementation Schedule, and BMP Site Plans adequately reflect the current site conditions and contractor operations?				
Are all BMPs shown on the BMP Site Plans installed in the proper location(s) and according to the details for the plan?				
Location:				

OTHER REQUIREMENTS				
Requirement	Yes	No	N/A	Corrective Action
Location:				
Location:				
Location:				
<b>General</b>				
Are there any other potential water pollution control concerns at the site?				
Location:				
Location:				
Location:				
Location:				



# Attachment I

## Report of Discharge

### INSTRUCTIONS

- This form shall be used and completed by the Contractor to report instances of discharges. The completed form shall be submitted to NDOT within 7 days of the assessment of non-compliance, discharge, written notice or orders from a regulatory agency.

To: Name of Engineer

Date: Insert Date

Subject: Notice of Non-Compliance

Project Name: Insert Project Name

Project Number: Project number

---

In accordance with the NPDES Statewide Permit for Storm Water Discharges Associated with Construction Activity, the following instance of discharge is noted:

**Date, time, and location of discharge**

Insert description and date of event

**Nature of the operation that caused the discharge**

insert description of operation

**Initial assessment of any impact cause by the discharge**

insert assessment

**Existing BMP(s) in place prior to discharge event**

list BMPs in place

**Date of deployment and type of BMPs deployed after the discharge.**

BMPs deployed after the discharge (with dates)

**Steps taken or planned to reduce, eliminate and/or prevent recurrence of the discharge**

insert steps taken to prevent recurrence

**Implementation and maintenance schedule for any affected BMPs**

insert implementation and maintenance schedule

If further information or a modification to the above schedule is required, notify the contact person below.

---

Name of Contact Person

---

Title

---

Company

---

Telephone Number

---

Signature

---

Date



# Attachment J

## Approved State or Local Plans

### **INSTRUCTIONS**

- Include copies of other local, state, or federal plans and permits. List of other plans and permits shall be included in Section 500.6 of the SWPPP.

# Attachment K

## Nevada Stormwater General Permit

### **INSTRUCTIONS**

- Include a copy of the Nevada Stormwater General Permit, NVR 100000, after this page.



## Appendix C

## Title Page

### INSTRUCTIONS

- Fill in the following information:

### REQUIRED TEXT

## WATER POLLUTION CONTROL PROGRAM (WPCP) for

Start Here...Triple Click here to insert Project Name-then TAB to next field

#### NDOT Contract Number:

INSERT NDOT CONTRACT NUMBER-THEN TAB TO NEXT FIELD.

#### Submitted by:

Insert Contractor's Company Name-then TAB.

Insert Address 1 and press ENTER for Address 2 or TAB to next field.-then TAB.

Insert City, State, ZIP-then TAB.

Insert Telephone-then TAB.

Insert Owner/Representative's Name-then TAB.

#### Project Site Address

Insert job site address, if any-then TAB.

Insert job site telephone number, if any-then TAB.

#### WPCP Prepared by:

Insert Company Name-then TAB.

Insert Address 1 and press ENTER to insert Address 2 or TAB to next field.

Insert City, State, ZIP-then TAB.

Insert Telephone-then TAB.

Insert Name and Title of Preparer-then TAB.

#### WPCP Preparation Date

Insert Date

**NOTE:** A working copy of this WPCP must be kept at the construction site or be locally available for review by NDEP and/or local regulatory agencies. Guidance for selecting and implementing BMPs is available in the NDOT Construction BMP Handbook. Attach additional pages when necessary to provide the required information.



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## Section 10 WPCP Certification

### 10.1 Contractor's Certification

#### INSTRUCTIONS

- The contractor, authorized and required by the Special Provisions to prepare and implement the WPCP, shall provide and sign the following certification:

#### REQUIRED TEXT

#### CONTRACTOR'S CERTIFICATION OF WPCP

"I certify under a penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. I also confirm that a storm water pollution prevention plan (SWPPP) has been completed, will be maintained at the project site from the start of construction activities, and that the SWPPP will be compliant with any applicable local sediment and erosion control plans. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines for knowing violations."

\_\_\_\_\_  
Contractor's Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Contractor's Name and Title

\_\_\_\_\_  
Contractor's Telephone Number



## Section 20

### Project Information

#### INSTRUCTIONS

- Answer the following questions in a narrative format that can be easily understood by a person who is not familiar with the project.
  - Introduction and Project Description: Provide a brief description of the project.
    - Describe the type(s) of work that will be performed.
    - Provide a brief description of the project location, including descriptive items such as county, route, post mile, city, and street names.
    - Describe proximity to receiving waters to which the project will discharge, including surface waters, drainage channels, and drainage systems.
    - Identify drainage system owners (municipality or agency).
  - Unique Site Features:
    - Provide a brief description of any unique site features (water bodies, wetlands, environmentally sensitive area, endangered or protected species, etc.)
    - Describe significant or high-risk activities that may impact storm water quality. Include any unique features or activities within or adjacent to water bodies (such as dredging, re-use of aerially deposited lead material, large excavations, or work within a water body).
  - Project Schedule: Provide a project schedule, either written or graphical. The schedule shall clearly show how the rainy/snow season relates to soil-disturbing and re-stabilization activities. The schedule only needs to be detailed enough to show major activities sequenced with the implementation of construction site BMPs, including:
    - project start and finish dates
    - rainy/snow season dates
    - date(s) for annual certifications
    - mobilization dates
    - mass clearing and grubbing, roadside clearing dates
    - major grading and excavation dates
    - dates for special activities named in other permits, such as Fish and Game
    - rainy/snow season implementation schedule
    - deployment of temporary soil stabilization BMPs

**INSERT CONTRACTOR'S COMPANY NAME-THEN TAB.**

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**Insert Date**

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- ☐ deployment of temporary sediment control BMPs
- ☐ deployment of non-storm water BMPs
- ☐ deployment of waste management and materials pollution control BMPs
- ☐ paving, sawcutting, and any other pavement related operations
- ☐ planned stockpiling operations
- ☐ dates for other significant long-term operations or activities that may plan non-storm water discharges such as dewatering, grinding, etc.
- ☐ Pollutant Source Identification:
  - ☐ Review the contract documents and associated environmental documents to determine the known site contaminants and list them in this section.
  - ☐ Review proposed construction activities and associated materials and wastes. Provide a list of those that have the potential to contribute to the discharge of pollutants to storm water.

**REQUIRED TEXT**

1. Introduction and Project Description:
2. Receiving Waters and Unique Site Features:
3. Project Schedule:
4. Potential Pollutant Sources:



**Water Pollution Control Program (WPCP)**  
**Start Here...Triple Click here to insert Project Name-then TAB to next field**  
**Contract No. INSERT NDOT CONTRACT NUMBER-THEN TAB TO NEXT FIELD.**

Insert SCHEDULE FOR POLLUTION CONTROL on next page

---

**INSERT CONTRACTOR'S COMPANY NAME-THEN TAB.**

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**Insert Date**

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## Section 30

# Pollution Sources and Control Measures

### INSTRUCTIONS

In this section, the Contractor shall describe the construction activities and the control practices (BMPs) that will be used to reduce or eliminate pollutant discharges from the construction site. The BMP selection process is an iterative process that first identifies the potential sources of pollution and then selects the tools (BMPs) to develop an effective WPCP.

- O For each of the following BMP categories:
  - O Identify all contract required BMPs (BMPs included as separate contract items or otherwise required by the Special Provisions)
  - O Identify minimum required BMPs (as indicated in the BMP selection tables)
  - O Select any additional BMPs necessary to eliminate or reduce the pollutants identified in "Potential Pollutant Sources" in Section 20.
  - O See section 2 of NDOT's *Construction Site Best Management Practices (BMPs) Manual*, for instructions for selection and implementation of BMPs, and working details for construction site BMPs.
- O Complete the BMP consideration checklists and descriptions in each of the following sections:
  - 30.1 Soil Stabilization (Erosion Control) and Sediment Control
  - 30.2 Non-Storm Water Management BMPs
  - 30.3 Materials Handling and Waste Management BMPs
- O Show the selected BMPs on the BMP Site Plans as described in Section 30.4.

### 30.1 Soil Stabilization (Erosion Control) and Sediment Control

#### INSTRUCTIONS

- Use each of the following sections to evaluate, select, and identify erosion and sediment controls that will be implemented during the project.
  - 30.1.1 Soil Stabilization Practices
  - 30.1.2 Sediment Control Practices
  - 30.1.3 Sediment Tracking Controls
  - 30.1.4 Wind Erosion Controls



### 30.1.1 Soil Stabilization Practices

#### INSTRUCTIONS

- Soil stabilization consists of source control measures that are designed to prevent soil particles from detaching and becoming suspended in storm water runoff. Soil stabilization BMPs protect the soil surface by covering and/or binding the soil particles.
- Provide a brief description of soil-disturbing activities, such as clearing and grubbing, grading, excavation, trenching, etc. Show the limits of the soil-disturbed areas on the BMP Site Plans.
- Complete the following selection table for temporary soil stabilization BMPs. All listed BMPs shall be considered for the project.
- If the project will not create soil disturbed areas, state as such and check "Not Used" for all BMPs in the soil stabilization selection table and enter "N/A" as the reason not used.
- If soil stabilization practices are not applicable, check "Not Used", and state why (i.e., no soil disturbed areas, soil stabilization BMPs not required based on project location, season and slopes) and state N/A (not applicable) in the table below.

#### EXAMPLE

Soil disturbing activities consist of minor grading along the shoulder and trenching for utilities and sound wall footings as shown on BMP SITE PLAN 2. Existing vegetation will be preserved outside the immediate construction zone as shown. Sub-base materials will be left in place during PCC removal and replacement, thus site soils will not be exposed in those areas.

#### REQUIRED TEXT

TEMPORARY EROSION CONTROL BMPs						
BMP No.	BMP	MINIMUM REQUIREMENT	CHECK IF CONTRACT REQUIREMENT	CHECK IF USED	CHECK IF NOT USED	IF NOT USED, STATE REASON
SS-1	Scheduling	4				
SS-2	Preservation of Existing Vegetation	4				
SS-3	Hydraulic Mulch	4 <sup>(1)</sup>				
SS-4	Hydroseeding	4 <sup>(1)</sup>				
SS-5	Soil Binder	4 <sup>(1)</sup>				
SS-6	Straw Mulch	4 <sup>(1)</sup>				

INSERT CONTRACTOR'S COMPANY NAME-THEN TAB.

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Insert Date

TEMPORARY EROSION CONTROL BMPs						
BMP No.	BMP	MINIMUM REQUIREMENT	CHECK IF CONTRACT REQUIREMENT	CHECK IF USED	CHECK IF NOT USED	IF NOT USED, STATE REASON
SS-7	Geotextiles, Plastic Covers, & Erosion Control Blankets/Mats	4 <sup>(1)</sup>				
SS-8	Wood Mulching					
SS-9	Earth Dikes/Drainage Swales & Lined Ditches					
SS-10	Outlet Protection/ Velocity Dissipation Devices					
SS-11	Slope Drains					
SS-12	Streambank Stabilization					
SS-13	Wind Erosion Control					

<sup>(1)</sup> The Contractor shall select one of the five measures listed or a combination thereof to achieve and maintain the contract's disturbed soil area (DSA) protection requirements.

#### 30.1.1.1 Selected Soil Stabilization BMPs

### INSTRUCTIONS

- Describe the locations and scheduled applications for each selected erosion control BMP.

### EXAMPLE

#### SS-2 Preservation of Existing Vegetation

Clearing and grubbing will be limited to the boundaries of active construction as shown on BMP SITE PLAN-2. Surrounding areas of existing vegetation will be protected in conformance with SS-2, Preservation of Existing Vegetation.

#### SS-5 Soil Binders (Copolymer)

BMP SS-5 was selected to minimize interference with the final (permanent) erosion control measures (paving and decorative landscaping). Soil binders will be applied to all non-active soil disturbed areas during the rainy season in conformance with the DSA protection requirements in the Construction Site BMP Manual.

### REQUIRED TEXT

**INSERT CONTRACTOR'S COMPANY NAME-THEN TAB.**

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### 30.1.2 Sediment Control Practices

#### INSTRUCTIONS

- Sediment controls are used to complement and enhance the selected soil stabilization measures. Sediment controls are designed to intercept runoff and capture suspended soil particles through a settlement or filtration process.
- Provide a brief description of soil-disturbed areas that will necessitate sediment control BMPs. References to the BMP Site Plans and/or Section 30.1.1 are often sufficient.
- Complete the following selection table for temporary sediment control BMPs. All listed BMPs shall be considered for the project.
- Show selected BMPs on the BMP Site Plans.
- If sediment controls are not applicable, state why (no soil disturbed areas, sediment controls not required based on project location, season, and slopes). Check "Not Used" for all BMPs in the sediment control BMP selection table and enter "N/A" for reason not used.

#### EXAMPLE 1

Disturbed soil areas are discussed in Section 30.1.1 and are shown on BMP SITE PLAN-2.

#### EXAMPLE 2

Not Applicable. All project slopes are less than 5% (20:1). According to Table X-X of the Construction Site BMPs Manual, sediment controls are not required.

#### REQUIRED TEXT

TEMPORARY SEDIMENT CONTROL BMPs						
BMP No.	BMP	MINIMUM REQUIREMENT	CHECK IF CONTRACT REQUIREMENT	CHECK IF USED	CHECK IF NOT USED	IF NOT USED, STATE REASON
SC-1	Silt Fence	4				
SC-2	Sediment Basin					
SC-3	Sediment Trap					
SC-4	Check Dam					
SC-5	Fiber Rolls					

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TEMPORARY SEDIMENT CONTROL BMPs						
BMP No.	BMP	MINIMUM REQUIREMENT	CHECK IF CONTRACT REQUIREMENT	CHECK IF USED	CHECK IF NOT USED	IF NOT USED, STATE REASON
SC-6	Gravel Bag Berm					
SC-7	Street Sweeping and Vacuuming	4				
SC-8	Storm Drain Inlet Protection	4				

### 30.1.2.1 Selected Sediment Control BMPs

#### INSTRUCTIONS

- Describe the locations and scheduled applications for each selected sediment control BMP.

#### EXAMPLE

According to the Construction Site BMP Manual, sediment controls for this project are required during the rainy season - continuously on non-active DSAs and before rain on active DSAs. Deployment locations will be as follows:

##### SC-1 Silt Fence

Silt fence will be deployed along the downstream (southern) construction site perimeter as shown on BMP SITE PLAN-2. Once the drainage channel is constructed and lined, silt fence will be extended north, along each side of the channel. See SC-4, Check Dam, below.

##### SC-4 Check Dams

Concentrated flows will be conveyed by the drainage channel that runs north-south, adjacent to the shoulder. During channel construction, sediment control will be provided by sand bag check dams, spaced at 30 ft. Once the channel is lined, silt fence will be installed along the channel banks to prevent sediment from entering the channel.

#### REQUIRED TEXT

### 30.1.3 Tracking Control

#### INSTRUCTIONS

- Sediment tracking controls are intended to minimize off-site sediment tracking and/or clean up tracked sediment before it enters the storm drain system or becomes a public nuisance. Sediment tracking

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control BMPs must be considered for each site exit point where vehicles and/or equipment may track sediment onto public or private roads.

- Show site entrance/exit locations on the BMP Site Plans.
- Provide a brief description of any site-specific conditions, such as clayey soils, that may make tracking particularly troublesome.
- If tracking controls are not required, state why (no disturbed soil areas). Check "Not Used" for each BMP in the sediment tracking selection table and enter "N/A" for reason not used.

### EXAMPLE

Site exit locations are shown on BMP SITE PLAN-2.

### REQUIRED TEXT

TRACKING CONTROL BMPs						
BMP No.	BMP	MINIMUM REQUIREMENT	CHECK IF CONTRACT REQUIREMENT	CHECK IF USED	CHECK IF NOT USED	IF NOT USED, STATE REASON
TC-1	Stabilized Construction Entrance/Exit					
TC-2	Stabilized Construction Roadway					
TC-3	Entrance/Outlet Tire Wash					
SC-7	Street Sweeping and Vacuuming	4				

#### 30.1.3.1 Selected Tracking Control BMPs

### INSTRUCTIONS

- Describe the locations and scheduled applications for each selected sediment tracking control BMP.

### EXAMPLE

SC-7 Street Sweeping and Vacuuming

Sediment sweeping and vacuuming will be provided year-round at the site entrance/exit locations shown on BMP SITE PLAN-2.

**REQUIRED TEXT**

### 30.1.4 Wind Erosion Controls

**INSTRUCTIONS**

- The objective of wind erosion controls is to prevent soil from being transported off-site by wind.
- Wind erosion controls shall be applied as necessary to prevent nuisance dust as required by the Standard Specifications, the Special Provisions, BMP SS-13, Wind Erosion Control, and as directed by the Engineer. Soil stabilization BMPs also provide wind erosion control benefits.

**REQUIRED TEXT**

Wind erosion controls will be applied as necessary to prevent nuisance dust as required by the Standard Specifications, the Special Provisions, BMP SS-13, Wind Erosion Control, and as directed by the Engineer.

### 30.2 Non-Storm Water Management BMPs

**INSTRUCTIONS**

- Non-storm water discharges which are not authorized under the General Permit or authorized under a separate NPDES permit are prohibited. Examples of prohibited discharges common to construction activities include:
  - Vehicle and equipment wash water, including concrete washout water
  - Slurries from concrete cutting and coring operations or AC grinding operations
  - Slurries from concrete or mortar mixing operations
  - Blast residue from high-pressure washing of structures or surfaces
  - Wash water from cleaning painting equipment
  - Runoff from dust control applications of water or dust palliatives
  - Sanitary and septic wastes
- List all activities that have the potential to produce non-storm water discharges. (Consider dewatering operations and any construction activity that requires water use.) Discuss planned dewatering operations with the RE to determine possible requirement for permits and/or treatment. Discuss how mobile operations, such as maintenance and fueling for large or stationary equipment, will be addressed.



- Use the following table to select BMPs as necessary to contain, remove, and dispose potential non-storm water discharges.
- Show BMP locations on the BMP Site Plans.

### EXAMPLE

The project will include the following activities that have the potential to generate non-storm water discharges:

- PCC Saw-cutting
- PCC Paving activities and washout of concrete mixing, placing, and finishing equipment
- Mortar mixing associated with sound wall construction.
- Dust control/watering for soil compaction

### REQUIRED TEXT

NON-STORM WATER MANAGEMENT BMPs						
BMP No.	BMP	MINIMUM REQUIREMENT	CHECK IF CONTRACT REQUIREMENT	CHECK IF USED	CHECK IF NOT USED	IF NOT USED, STATE REASON
NS-1	Water Conservation Practices					
NS-2	Dewatering Operations					
NS-3	Paving and Grinding Operations					
NS-4	Temporary Stream Crossing					
NS-5	Clear Water Diversion					
NS-6	Illicit Discharge/Illegal Dumping Reporting	4				
NS-7	Potable Water/Irrigation					
NS-8	Vehicle and Equipment Cleaning	4				
NS-9	Vehicle and Equipment Fueling	4				
NS-10	Vehicle and Equipment Maintenance	4				
NS-11	Pile Driving and Drilling Operations					

**INSERT CONTRACTOR'S COMPANY NAME-THEN TAB.**

<b>NON-STORM WATER MANAGEMENT BMPs</b>						
<b>BMP No.</b>	<b>BMP</b>	<b>MINIMUM REQUIREMENT</b>	<b>CHECK IF CONTRACT REQUIREMENT</b>	<b>CHECK IF USED</b>	<b>CHECK IF NOT USED</b>	<b>IF NOT USED, STATE REASON</b>
NS-12	Concrete and Pavement Curing					
NS-13	Material and Equipment Use Over Water					
NS-14	Concrete Finishing					
NS-14	Material and Equipment Use Over Water					
NS-15	Structure Demolition/Removal Over or Adjacent to Water					
NS-16	Temporary Batch Plants					

### 30.2.1 Selected Non-Storm Water Management BMPs

#### **INSTRUCTIONS**

- Describe the scheduled application of the selected BMPs.

#### **EXAMPLE**

The following BMPs will be implemented for PCC Saw-cutting, PCC Paving Activities, and mortar mixing activities. A 10 ft by 10 ft below-grade concrete washout facility will be constructed and maintained at the location shown on the plan to contain and cure all concrete/mortar slurries and wash waters.

NS-3 Paving and Grinding Operations

WM-8 Concrete Waste Management

The following BMPs will be implemented to reduce/eliminate discharged from dust control activities:

WE-1 Wind Erosion Control

NS-1 Water Conservation Practices

#### **REQUIRED TEXT**

**INSERT CONTRACTOR'S COMPANY NAME-THEN TAB.**

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## 30.3 Waste Management and Materials Pollution Control BMPs

### **INSTRUCTIONS**

- Waste management consists of implementing procedural and structural BMPs for collecting, handling, storing and disposing of wastes generated by a construction project to prevent the release of waste materials into storm water discharges. Wastes are going to be generated during construction; however, the methods in which the wastes are collected, stored, and removed will determine the success of the waste management activities. Construction site wastes can range from residues collected from non-storm water discharges (i.e. paint removal) to general site litter and debris (i.e. empty marker paint cans).
- Material pollution control (materials handling) consist of implementing procedural and structural BMPs for handling, storing and using construction materials to prevent the release of those materials into storm water discharges. The amount and type of construction materials to be utilized at the site will be dependent upon the type of construction and the length of the construction period. The materials may be used continuously, such as fuel for vehicles and equipment, or the materials may be used for a discrete period, such as fertilizer for landscaping.
- Waste management and materials pollution control BMPs must be implemented to minimize storm water contact with construction materials, wastes and service areas, and to prevent materials and wastes from being discharged off-site.
- Review project activities to identify likely construction materials and wastes. Identify materials and wastes with special handling or disposal requirements, such as lead contaminated soils. List anticipated materials and wastes below.
- Based on the listed materials and wastes, use the following materials handling and waste management BMP consideration checklist to select appropriate BMPs.
- Locate storage, waste, and handling locations and facilities on the BMP Site Plans.

### **EXAMPLE**

The following construction materials and wastes, which have the potential to cause storm water pollution, will be generated on-site or brought on-site for immediate use or temporary storage:

- Mortar mix
- Raw landscaping materials and wastes (topsoil, plant materials, herbicides, fertilizer, mulch)
- BMP materials (sandbags, liquid copolymer)
- Treated lumber (materials and wastes)
- Reinforcing bar
- Plated metal fencing materials
- PCC rubble
- Block rubble
- General litter

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**REQUIRED TEXT**

<b>WASTE MANAGEMENT AND MATERIALS POLLUTION CONTROL BMPs</b>						
<b>BMP No.</b>	<b>BMP</b>	<b>MINIMUM REQUIREMENT</b>	<b>CHECK IF CONTRACT REQUIREMENT</b>	<b>CHECK IF USED</b>	<b>CHECK IF NOT USED</b>	<b>IF NOT USED, STATE REASON</b>
WM-1	Material Delivery and Storage	4				
WM-2	Material Use	4				
WM-3	Asphalt Concrete Stockpiles					
WM-4	Spill Prevention and Control	4				
WM-5	Construction and Litter Debris Management	4				
WM-6	Concrete Waste Management					
WM-7	Sanitary/Septic Waste Management	4				
WM-8	Liquid Waste Management					

### 30.3.1 Selected Waste Management and Materials Pollution Control BMPs

**INSTRUCTIONS**

- Describe the scheduled application of the selected BMPs.

**EXAMPLE**

The BMPs checked above will be implemented on the project. Because of site constraints, most materials and wastes will be immediately used and removed, respectively. BMP materials will be mixed/prepared off-site and only brought on-site by the erosion control contractor for immediate application/deployment. PCC rubble will be loaded directly into trucks for immediate removal. Raw wall construction materials will be stockpiled for use that day and stored on pallets.

**REQUIRED TEXT**

**INSERT CONTRACTOR'S COMPANY NAME-THEN TAB.**

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## 30.4 BMP Site Plans

### **INSTRUCTIONS**

- The contractor will include BMP Site Plans in the WPCP to illustrate the locations, applications, and deployment of the BMPs checked in the preceding sections.
- The BMP Site Plans shall include one or more drawings at a scale sufficient to clearly show on-site drainage patterns and the location of erosion and sediment control BMPs. The BMP Site Plans shall be no smaller than the "reduced plans" (approximately 11" x 17") issued by NDOT.
- The BMP Site Plans shall include:
  - Detail sheets showing construction details for the BMPs that will be used.
  - Location sheets, usually modified layout, grading, stage construction, and/or drainage sheets, showing the locations of BMPs that will be used. Delineation of BMPs will be in the form of construction notes and/or symbols.
- Include the BMP Site Plans as an attachment to the WPCP.

### **REQUIRED TEXT**

The BMP Site Plans are included as an attachment to this Water Pollution Control Program.

## 30.5 Construction BMP Maintenance, Inspection, and Repair

### **INSTRUCTIONS**

- A program for the regular inspection, maintenance, and repair of BMPs will be included in the WPCP on the form that follows. The contractor's attention is directed to NDOT's "Construction Site Best Management Practices Manual" where the working details describe requirements for maintenance and inspection of BMPs.
- Appendix B, Attachment G of the "Construction Site Best Management Practices Manual" shows a sample Maintenance, Inspection and Repair Program.
- At a minimum, the contractor must inspect the site before and after storm events, and at 24-hour intervals during extended storms. The project Special Provisions may require additional inspections.
- The results of the inspection and assessment shall be recorded on the Construction Site Inspection Checklist included in Appendix B to the "Construction Site Best Management Practices Manual", Attachment H.
- A copy of each completed Construction Site Inspection Checklist shall be provided to the RE and a copy attached to the on-site WPCP. A tracking or follow-up procedure must follow any inspection that identifies deficiencies in BMPs.

### **REQUIRED TEXT**

The inspection, maintenance and repair program is as follows:

**INSERT CONTRACTOR'S COMPANY NAME-THEN TAB.**

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**Contract No. INSERT NDOT CONTRACT NUMBER-THEN TAB TO NEXT FIELD.**

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## Section 40 Amendments

### INSTRUCTIONS

- The WPCP shall be amended whenever there is a change in construction or operations that may cause the discharge of significant quantities of pollutants to surface waters, ground waters, municipal storm drain systems, or when deemed necessary by the RE. All WPCP amendments shall be documented in letter format and include revised BMP Site Plans, as appropriate. WPCP amendments shall be certified by the contractor and require approval by the RE. Approved amendments shall be attached to the Contractor's on-site WPCP.
- The following items will be included in the amendment, as appropriate:
  - Discuss who requested the amendment.
  - Describe location of proposed change.
  - Describe reason for change.
  - Describe the original BMP proposed, if any.
  - Describe the new BMP proposed.
  - Include any revised BMP Site Plans for detail or location changes.
- The following certification by the contractor will be included for each amendment.

### EXAMPLE

- This amendment was requested by NDEP, NDOT, or the Contractor.
- The change is to relocate the concrete washout away from the drainage intake at Miller Ave. It is now located on the northeast section of the construction site, see revised map.
- The reason the change is necessary is that water from concrete washout had the potential to enter the nearby drainage inlet.
- See the revised BMP Site Plans.

### REQUIRED TEXT

#### Construction Contractor's Certification of the WPCP Amendment

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

**INSERT CONTRACTOR'S COMPANY NAME-THEN TAB.**

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**Water Pollution Control Program (WPCP)**  
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**Contract No. INSERT NDOT CONTRACT NUMBER-THEN TAB TO NEXT FIELD.**

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Signature

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Date

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Name and Title

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Phone Number

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## 2006 Water Quality Manuals

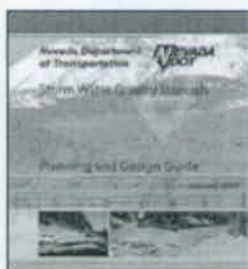
[2006 Planning and Design Guide](#) | [2006 Construction Site Best Management Practices Manual](#) | [2004 Construction Site Best Management Practices Manual](#)

The Nevada Department of Transportation has prepared two **Water Quality Manuals**, the Planning and Design Guide and the Construction Site Best Management Practices Manual, to assist in compliance with the Clean Water Act, as well as state and local regulations. These manuals are not intended to establish a legal standard of care of conduct. These manuals are subject to modification, revision, and addendum as conditions warrant.



For questions or concerns regarding either of these documents, please refer to the acknowledgements pages in each manual to contact a program representative, or contact the NDOT Hydraulics Section at (775) 888-7619.

The NDOT Construction Site Best Management Practices Manual is available for purchase. The cost is \$30.00. Contact NDOT Administrative Services at (775) 888-7070. Updates to this manual will be listed as addendums and posted for download from this website. Notification of posted updates will not be provided.



### 2006 Planning and Design Guide

The Planning and Design Guide (PDG) manual, part of NDOT's water quality, erosion, and sediment control program, provides information and procedures relevant to the storm water activities and responsibilities of the Nevada Department of Transportation. The PDG addresses key regulatory, policy, and technical requirements to incorporate **permanent** storm water Best Management Practices into the planning and design of applicable NDOT projects. If you have a 2004 Planning and Design Guide, please download the manual revision [addendum](#) [here](#).

### 2006 Planning and Design Guide (5 MB)

- I. Acknowledgements (92 kb)
- II. Table of Contents (63 kb)
- III. Section 1-Introduction (218 kb)
- IV. Section 2-Storm Water Quality Considerations during Project Planning (231 kb)
- V. Section 3-Storm Water Quality Considerations during Project Design (543 kb)
- VI. Section 4-Guidance for Selection and Design of Permanent BMPs (377 kb)
- VII. Appendix A-Environmental Categorization Score Sheet and TRPA documents and forms (766 kb)
- VIII. Appendix B-Working Details for Permanent BMPs (2.6 MB)
- IX. Appendix C-Design Examples for Permanent Treatment BMPs (169 kb)
- X. Appendix D-Relevant Storm Water Documents and Web Sites (112 kb)



**2006 Construction Site Best Management Practices**

This manual, part of NDOT's statewide effort to prevent pollution in storm water runoff from construction projects, addresses minimum contractor requirements for selecting, implementing and maintaining Construction Site Best Management Practices. If you have a 2004 Construction Site Best Management Practices manual, please download the manual revision [addendum](#) here.



**For construction projects advertised prior to January 2006, the 2004 Construction Site Best Management Practices Manual may have been required by the specifications as a contract document.**

**2006 Construction Site Best Management Practices (9 MB)**

- I. Acknowledgements (90 kb)
- II. Table of Contents (53 kb)
- III. Section 1-Introduction (100 kb)
- IV. Section 2-Selecting and Implementing Construction Site Best Management Practices (628 kb)
- V. Section 3-Temporary Soil Stabilization (2.1 MB)
- VI. Section 4-Temporary Sediment Control (1.9 MB)
- VII. Section 5-Tracking Control (585 kb)
- VIII. Section 6-Non-Storm Water Management (2.5 MB)
- IX. Section 7-Waste Management and Materials Pollution Control (898 MB)
- X. Appendix A-Abbreviations, Acronyms, and Definition of Terms (101 kb)
- XI. Appendix B-Storm Water Pollution Prevention Plan (SWPPP) Template (386 kb)

**Important Note:** *User is not obligated to use the SWPPP template in these manuals. Electronic SWPPP Template can be found at: <http://ndep.nv.gov/bwpc/storm01.htm>. NDEP's Temporary Working in Waterways forms can be found at <http://ndep.nv.gov/bwpc/forms.htm>.*

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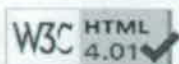


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## 2004 Construction Site Best Management Practices Manual

[2006 Planning and Design Guide](#) | [2006 Construction Site Best Management Practices Manual](#) | [2004 Construction Site Best Management Practices Manual](#)



**The 2004 Best Management Practices manual should only be referenced for projects advertised prior to January 2006.**

For questions or concerns regarding the Best Management Practices manual, please refer to the acknowledgements pages in the manual to contact a program representative, or contact the NDOT Hydraulics Section at (775) 888-7619.

Updates to this manual will be listed as addendums and posted for download from this website. Notification of posted updates will not be provided.

### 2004 Construction Site Best Management Practices

This manual, part of NDOT's statewide effort to prevent pollution in storm water runoff from construction projects, addresses minimum contractor requirements for selecting, implementing and maintaining Construction Site Best Management Practices.

#### 2004 Construction Site Best Management Practices (10 MB)

- I. Section 1-Introduction (238 kb)
- II. Section 2-Selecting and Implementing Construction Site Best Management Practices (994 kb)
- III. Section 3-Temporary Soil Stabilization (2.2 MB)
- IV. Section 4-Temporary Sediment Control (2.1 MB)
- V. Section 5-Tracking Control (688 kb)
- VI. Section 6-Non-Storm Water Management (3.3 MB)
- VII. Section 7-Waste Management and Materials Pollution (1.1 MB)
- VIII. Appendix A-Abbreviations, Acronyms, and Definition of Terms (210 kb)
- IX. Appendix B-Storm Water Pollution Prevention Plan (SWPPP) Template (805 kb)
- X. Appendix C-Water Pollution Control Program (WPCP) Template (274 kb)

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